Exhibit F

This page intentionally left blank.

MONTEREY COUNTY
RESOURCE MANAGEMENT AGENCY
Carl P. Holm, AICP, Director

Building Services / Environmental Services / Planning Services / Public Works & Facilities
168 W. Alisal Street, 2nd Floor (831)755-5025
Salinas, California 93901 www.co.monterey.ca.us/rma

FILED
NOV 30 2016
STEPHEN L. VAGNINI
MONTEREY COUNTY CLERK
DEPUTY

NOTICE OF AVAILABILITY
DRAFT ENVIRONMENTAL IMPACT REPORT (DEIR)

PROJECT TITLE: **CARMEL RIO ROAD PROJECT (PLN140089; SCH#2015071046)**

PROJECT LOCATION: **SOUTHWESTERN PORTION OF MONTEREY COUNTY; APPROXIMATELY 0.7-MILE SOUTHEAST OF THE CITY OF CARMEL-BY-THE-SEA; WITHIN THE CARMEL VALLEY MASTER PLAN AREA OF UNINCORPORATED MONTEREY COUNTY.**

Notice is hereby given that the County of Monterey is seeking written comment on the Draft Environmental Impact Report (DEIR) on the Carmel Rio Road Project (PLN140089; SCH#2015071046) in accordance with the California Environmental Quality Act. The public review period will begin on December 2, 2016 and end on January 23, 2017. This review period is established for the purpose of receiving written comments on the accuracy and adequacy of the DEIR together with other information relative to the environmental effect of the project.

PROJECT DESCRIPTION: The proposed project is a mixed income residential subdivision on 7.9-acres of land, three-legal parcels, located at 15 and 26500 Val Verde Drive, within the Carmel Valley Master Plan area, in unincorporated Monterey County, California. The proposed project would fill and grade the area to bring the southwestern corner above the FEMA-100 year flood zone, subdivide the three existing lots into 25 lots: 24 of which would be developed with one 1,670-square foot market single-family unit per lot, and one remaining lot that would be developed with seven inclusionary affordable housing units of approximately 860 square feet each. The project would require a Zoning Ordinance Amendment that would add clarification to County Code Section 21.14.05A to allow an exception to exceed the four unit/acre lot density limit for the purpose of affordable housing. Access from Val Verde Drive would be improved by paving this roadway from Rio Road to the northern property boundary, widening it to include two 17-foot travel lanes for a total width of 34 feet and constructing an internal looped road with two entrances to Val Verde Drive. The project would be served by a Community Water System, sourced from the two existing wells, one acting as primary and one serving as back-up. On-site water infrastructure would include a water treatment unit and two storage tanks. The project would incorporate native and drought tolerant landscaping and on-site runoff would be detained or filtered to prevent sediment from leaving the site.

LEAD AGENCY: **COUNTY OF MONTEREY RESOURCE MANAGEMENT AGENCY -PLANNING**

ADDRESSES WHERE A COPY OF THE DRAFT EIR IS AVAILABLE FOR REVIEW:

County of Monterey
RMA-Planning
168 W. Alisal St., 2nd Floor
Salinas, CA 93901
(831) 755-5025

Carmel Valley Library
65 W. Carmel Valley Road
Carmel Valley, CA 93924
(831) 659-2377

Monterey Public Library
625 Pacific Street
Monterey, CA 93940
(831) 649-3933

Documents referenced in the DEIR are available at the Monterey County RMA – Planning at the address listed above.

PUBLIC REVIEW PERIOD: DECEMBER 2, 2016 THROUGH JANUARY 23, 2017

POTENTIAL SIGNIFICANT ENVIRONMENTAL EFFECTS: The DEIR identifies impacts in the following resource areas that are either less than significant or are significant but can be mitigated to a less than significant level: aesthetics, air quality, biological resources, climate change/greenhouse gases, cultural resources, geology/soils, hazards/hazardous materials, hydrology and water quality, land use and planning, noise, population and housing, public services, recreation, and utilities.

The DEIR identifies impacts in the following resource areas that are significant and cannot be mitigated to a less than significant level: transportation/traffic.

Public hearings will be held, subsequent to the public review period, at a time and place to be specified by legal advertisement in a local newspaper of general circulation. If you would like to be notified of the hearings or would like additional information please contact:

Bob Schubert
Monterey County Resource Management Agency - Planning
168 W. Alisal St., 2nd Floor
Salinas, CA 93901
Phone: (831) 755-5183
E-mail: schubertbj@co.monterey.ca.us

We welcome your comments during the public review period. You may submit your comments in hard copy to the name and address above. The Department also accepts comments via e-mail or facsimile but requests that you follow these instructions to ensure that the Department has received your comments. To submit your comments by e-mail, please send a complete document including all attachments to: **CEQAcomments@co.monterey.ca.us**

An e-mailed document should contain the name of the person or entity submitting the comments and contact information such as phone number, mailing address and/or e-mail address and include any and all attachments referenced in the e-mail. To ensure a complete and accurate record, we request that you also provide a follow-up hard copy to the name and address listed above. If you do not wish to send a follow-up hard copy, then please send a second e-mail requesting confirmation of receipt of comments with enough information to confirm that the entire document was received. If you do not receive e-mail confirmation of receipt of comments, then please submit a hard copy of your comments to ensure inclusion in the environmental record or contact the Department to ensure the Department has received your comments.

Facsimile (fax) copies will be accepted with a cover page describing the extent (e.g. number of pages) being transmitted. A faxed document must contain a signature and all attachments referenced therein. Faxed documents should be sent to the contact noted above at **(831) 757-9516**. To ensure a complete and accurate record, we request that you also provide a follow-up hard copy to the name and address listed above. If you do not wish to send a follow-up hard copy, then please contact the Department to confirm that the entire document was received.

The Draft EIR is available on CD for purchase from Monterey County RMA - Planning at the above address. The documents are also available on the County website at: http://www.co.monterey.ca.us/government/departments-i-z/resource-management-agency/planning .

County of Monterey

Carmel Rio Road Project

Draft Environmental Impact Report

SCH # 2015071046

November 2016

rincon

Environmental Scientists Planners Engineers

Draft
Environmental Impact Report

Carmel Rio Road Project

Prepared by:

County of Monterey
168 W. Alisal Street, 2nd Floor
Salinas, CA 93901
831-755-5025

Prepared with the assistance of:

Rincon Consultants, Inc.
437 Figueroa Street, Suite 203
Monterey, California 93940
831-333-0310

November 2016

This report produced on 50% recycled paper with 30% post-consumer content.

Carmel Rio Road Project EIR

Table of Contents

Page

Executive Summary ES-1

1.0 Introduction
- 1.1 Purpose and Legal Authority 1-1
- 1.2 EIR Scope and Content 1-1
- 1.3 Lead, Responsible and Trustee Agencies 1-4
- 1.4 Environmental Review Process 1-4

2.0 Project Description
- 2.1 Project Applicant 2-1
- 2.2 Project Location 2-1
- 2.3 Existing Site Characteristics 2-1
- 2.4 Project Characteristics 2-5
- 2.5 Project Objectives 2-19
- 2.6 Required Approvals 2-19

3.0 Environmental Setting
- 3.1 Regional Setting 3-1
- 3.2 Project Site Setting 3-1
- 3.3 Cumulative Projects Setting 3-2

4.0 Environmental Impact Analysis
- 4.1 Aesthetics 4.1-1
- 4.2 Air Quality 4.2-1
- 4.3 Biological Resources 4.3-1
- 4.4 Climate Change 4.4-1
- 4.5 Cultural Resources 4.5-1
- 4.6 Geology and Soils 4.6-1
- 4.7 Hazards 4.7-1
- 4.8 Hydrology and Water Quality 4.8-1
- 4.9 Land Use 4.9-1
- 4.10 Noise 4.10-1
- 4.11 Population and Housing 4.11-1
- 4.12 Public Services 4.12-1
- 4.13 Recreation 4.13-1
- 4.14 Transportation and Circulation 4.14-1
- 4.15 Utilities and Service Systems 4.15-1
- 4.16 Effects Found not to be Significant 4.16-1

5.0 Other CEQA Required Sections
5.1 Growth-inducing Effects 5-1
5.2 Significant and Irreversible Environmental Effects 5-4
5.3 Energy Effects 5-6

6.0 Alternatives
6.1 Alternatives Considered But Rejected 6-2
6.2 Alternative 1: No Project/No Development 6-3
6.3 Alternative 2: No Project/ Existing Zoning 6-4
6.4 Alternative 3: Modified Subdivision 6-9
6.5 Alternative 4: Reduced Density 6-14
6.6 Alternative 5: Clustered Design 6-20
6.7 Environmentally Superior Alternative 6-26

7.0 References and Report Preparers
7.1 References 7-1
7.2 List of Preparers 7-11

List of Figures

Figure 1-1 CEQA Environmental Review Process 1-5
Figure 2-1 Regional Location 2-2
Figure 2-2 Project Site 2-3
Figure 2-3 Site Plan 2-7
Figure 2-4a Preliminary Architectural Renderings: Market Rate Single-Family Units 2-9
Figure 2-4b Preliminary Architectural Renderings: Inclusionary Units 2-10
Figure 2-5 Utility Plan 2-13
Figure 2-6 Grading and Soil Erosion Control Plan 2-17
Figure 4.1-1 Site Photographs 4.1-4
Figure 4.1-2 Site Photographs 4.1-5
Figure 4.3-1 Vegetation Communities Map 4.3-6
Figure 4.3-2a Sensitive Animals Reported in the California Natural Diversity Database and Federally Designated Critical Habitat 4.3-9
Figure 4.3-2b Sensitive Natural Communities and Plants Reported in the California Natural Diversity Database 4.3-10
Figure 4.6-1 Regional Faults 4.6-3
Figure 4.8-1 FEMA Flood Map 4.8-12
Figure 4.9-1 Existing Land Uses 4.9-2
Figure 4.10-1 Monterey County Community Noise Exposure 4.10-8
Figure 4.14-1 Study Intersections 4.14-6
Figure 4.14-2 Existing Conditions AM & PM Peak Hour Volumes 4.14-9
Figure 4.14-3 Project Trip Distribution 4.14-14
Figure 4.14-4 Project Trip Assignment AM & PM Peak Hour Volumes 4.14-15
Figure 4.14-5 Background Conditions AM & PM Peak Hour Volumes 4.14-17
Figure 4.14-6 Cumulative Conditions AM & PM Peak Hour Volumes 4.14-22

Figure 4.14-7 Existing plus Project Conditions AM & PM Peak Hour Volumes 4.14-33
Figure 4.14-8 Background plus Project Conditions AM & PM Peak Hour Volumes 4.14-40
Figure 4.14-9 Cumulative plus Project Conditions AM & PM Peak Hour Volumes 4.14-47

List of Tables

Table ES-1 Summary of Significant Environmental Impacts, Mitigation Measures, and Residual Impacts ES-3
Table 1-1 NOP Comment Issues 1-2
Table 2-1 Characteristics of the Project Site and Vicinity 2-4
Table 3-1 Cumulative Project List 3-3
Table 4.1-1 Impact and Mitigation Summary: Aesthetics 4.1-1
Table 4.2-1 Impact and Mitigation Summary: Air Quality 4.2-1
Table 4.2-2 Current Federal and State Ambient Air Quality Standards 4.2-5
Table 4.2-3 Attainment Status of the North Central Coast Air Basin 4.2-5
Table 4.2-4 Ambient Air Quality Data 4.2-6
Table 4.2-5 Project Construction Emissions 4.2-15
Table 4.2-6 Operational Emissions 4.2-17
Table 4.3-1 Impact and Mitigation Summary: Biological Resources 4.3-1
Table 4.3-2 Acreages of Vegetation Communities Found within the Project Site 4.3-7
Table 4.3-3 Special Status Species Known or with Potential to Occur Within the Project Site or Vicinity 4.3-12
Table 4.4-1 Impact and Mitigation Summary: Climate Change 4.4-1
Table 4.4-2 Estimated Annual Construction Emissions 4.4-13
Table 4.4-3 Estimated Annual Operational Emissions 4.4-14
Table 4.5-1 Impact and Mitigation Summary: Cultural Resources 4.5-1
Table 4.5-2 Geologic Unit within the Project Site 4.5-8
Table 4.6-1 Impact and Mitigation Summary: Geology and Soils 4.6-1
Table 4.7-1 Impact and Mitigation Summary: Hazards 4.7-1
Table 4.8-1 Impact and Mitigation Summary: Hydrology and Water Quality 4.8-1
Table 4.9-1 Impact and Mitigation Summary: Land Use 4.9-1
Table 4.9-2 Policy Consistency: Monterey County 2010 General Plan 4.9-7
Table 4.9-3 Policy Consistency: Carmel Valley Master Plan 4.9-17
Table 4.10-1 Impact and Mitigation Summary: Nose 4.10-1
Table 4.10-2 Human Response to Different Levels of Groundborne Vibration 4.10-5
Table 4.10-3 Sound Measurement Results 4.10-6
Table 4.10-4 OSHA Permissible Noise Exposure Standards 4.10-7
Table 4.10-5 Significance of Changes in Operational Roadway Noise Exposure 4.10-10
Table 4.10-6 Typical Construction Equipment Noise Levels 4.10-11
Table 4.10-7 Vibration Levels for Construction Equipment 4.10-15
Table 4.11-1 Impact and Mitigation Summary: Population and Housing 4.11-1
Table 4.11-2 Current Population 4.11-1

Table 4.11-3 Median Household Income in 2013 ..... 4.11-2
Table 4.11-4 Household Characteristics 4.11-3
Table 4.11-5 Projected Housing and Population 4.11-3
Table 4.11-6 RHNA Allocation Process for Unincorporated Monterey County 4.11-4
Table 4.12-1 Impact and Mitigation Summary: Public Services 4.12-1
Table 4.13-1 Impact and Mitigation Summary: Recreation 4.13-1
Table 4.13-2 Local Open Spaces and Public Recreation Resources 4.13-2
Table 4.14-1 Impact and Mitigation Summary: Transportation and Circulation 4.14-1
Table 4.14-2 Existing Conditions Intersection Levels of Service 4.14-8
Table 4.14-3 Existing Conditions Arterial Levels of Service 4.14-10
Table 4.14-4 Existing Conditions Road Segment 6 & 7 Levels of Service 4.14-11
Table 4.14-5 Existing Conditions Road Segment 8-10 Levels of Service 4.14-11
Table 4.14-6 Project Trip Generation Rates 4.14-12
Table 4.14-7 Project Trip Generation Volumes 4.14-13
Table 4.14-8 Background Conditions Intersection Levels of Service 4.14-16
Table 4-14-9 Background Conditions Arterial Levels of Service 4.14-18
Table 4.14-10 Background Conditions Road Segments 6 & 7 Levels of Service 4.14-19
Table 4.14-11 Background Conditions Road Segments 8-10 Levels of Service 4.14-19
Table 4-14-12 Cumulative Conditions Intersections Levels of Service 4.14-21
Table 4.14-13 Cumulative Conditions Arterial Levels of Service 4.14-23
Table 4.14-14 Cumulative Conditions Road Segments 6 and 7 Levels of Service 4.14-25
Table 4.14-15 Background Conditions Road Segments 8-10 Levels of Service 4.14-25
Table 4.14-16 Carmel Valley Road ADT Thresholds 4.14-27
Table 4.14-17 Existing plus Project Conditions Intersection Levels of Service 4.14-32
Table 4.14-18 Existing plus Project Conditions Arterial Levels of Service 4.14-34
Table 4.14-19 Existing plus Project Conditions Road Segments 6 and 7 Levels of Service 4.14-35
Table 4-14-20 Existing plus Project Conditions Road Segments 8-10 Levels of Service 4.14-35
Table 4.14-21 Background plus Project Conditions Intersection Levels of Service 4.14-39
Table 4.14-22 Background plus Project Conditions Arterial Levels of Service 4.14-41
Table 4.14-23 Background plus Project Conditions Road Segments 6 and 7 Levels of Service 4.14-42
Table 4.14-24 Background plus Project Conditions Road Segments 8-10 Levels of Service 4.14-42
Table 4.14-25 Cumulative plus Project Conditions Intersections Levels of Service 4.14-46
Table 4.14-26 Cumulative plus Project Conditions Arterial Levels of Service 4.14-48
Table 4-14-27 Cumulative plus Project Conditions Road Segments 6 and 7 Levels of Service 4.14-49
Table 4.14-28 Cumulative plus Project Conditions Road Segments 8-10 Levels of Service 4.14-49

Table 4.15-1 Impact and Mitigation Summary: Utilities and Service Systems 4.15-1
Table 4.15-2 Existing and Remaining Capacity in the Monterey Peninsula Landfill 4.15-3
Table 4.15-3 Projected Solid Waste Generation 4.15-10
Table 6-1 Existing On-Site Parcels 6-4
Table 6-2 Comparison of Project Alternatives 6-27

Appendices

Appendix A Notice of Preparation and Letters
Appendix B Visual Impact Study
Appendix C Air Quality
- C1 Modeling Results
- C2 MBARD Consistency Procedure

Appendix D Biological Reports
- D1 Biological Assessment
- D2 Updated Biological Assessment

Appendix E Cultural Reports
- E1 Preliminary Archaeological Reconnaissance
- E2 Addendum to the Preliminary Archaeological Reconnaissance
- E3 Phase I Historic Review
- E4 Addendum to the Phase I Historic Review
- E5 Cultural Reports Peer Review
- E6 Cultural Reports Peer Review Addendum

Appendix F Geology and Soils Reports
- F1 Geologic Hazards Study
- F2 Geotechnical Engineering Report and Liquefaction Study

Appendix G Hydrology and Water Quality Studies
- G1 Review of Stormwater Management and Flood Control Issues
- G2 Groundwater Supply Technical Report

Appendix H Sound Level Measurements
Appendix I Traffic Impact Analysis

This page intentionally left blank.

EXECUTIVE SUMMARY

This section summarizes the characteristics of the proposed project as well as the environmental impacts, mitigation measures, and residual impacts associated with implementation of the proposed project.

PROJECT SYNOPSIS

Project Proponent

Carmel Rio Road LLC
c/o Brian Clark
430 Ortiz, #B
Sand City, CA 93955

PROJECT DESCRIPTION

The Carmel Rio Road LLC is proposing to build a mixed income residential subdivision on 7.9-acres of land, three-legal parcels, located at 15 and 26500 Val Verde Drive, within the Carmel Valley Master Plan Area, in unincorporated Monterey County, California. The predominantly flat, 7.9-acre project site currently consists of 6.6 acres of row crop agriculture on two parcels and a 1.3 acre parcel of existing single-family residence with a detached garage and planted mixed woodland habitat on the southeast corner of the site

The proposed project would fill and grade the area to bring the southwestern corner above the FEMA-100 year flood zone, subdivide the three existing lots into 25 lots: 24 of which would be developed with one 1,670 square foot market single-family unit per lot, while the remaining lot would be developed with seven inclusionary affordable housing units of approximately 860 square feet. The project would require a Zoning Ordinance Amendment that would add clarification to County Code Section 21.14.05A to allow an exception to exceed the four unit/acre lot density limit for the purpose of affordable housing. Applicants would provide and improve access from Val Verde Drive by paving this roadway from Rio Road to the northern property boundary, widening it to include two 17-foot travel lanes for a total width of 34 feet and constructing an internal looped road with two entrances to Val Verde Drive, as shown in Figure 2-3.

The project would be served by a Community Water System (CWS), sourced from the two existing wells, one acting as a primary and one serving as a back-up**.** On-site water infrastructure would include a 24-foot by 12-foot by 10-foot water treatment unit and two 4,500 gallon storage tanks, all located on the proposed inclusionary lot. Treated water would be conveyed to on-site residences through a conventional gravity system of proposed 8-inch water pipes located within proposed street right-of-ways. The project would incorporate native and drought tolerant landscaping and on-site runoff would be detained or filtered by berms, vegetated filter strips, or catch basins to prevent sediment from leaving the site.

Project Objectives. The applicant's objectives of the proposed Carmel Rio Road project are summarized as follows:

- *Create a mix of market rate and affordable housing.*
- *Create an economically integrated infill project integrated with pedestrian and bike paths and walkways.*
- *Accommodate diverse modes of transportation*
- *Integrate energy-efficient home designs, optional solar power generation, and water conservation.*
- *Achieve objectives of the CVMP by implementing high-density housing.*
- *Position project as an infill development which can minimize extension of infrastructure and reduce travel in the Carmel Valley by providing housing adjacent to commercial uses.*
- *Provide a balance of housing supporting local needs with a mix of 25% inclusionary housing and the balance of market rate.*

ALTERNATIVES

Five alternatives to the proposed project were chosen for analysis as follows:

- *Alternative 1: No Project/No Development*
- *Alternative 2: No Project/Existing Zoning*
- *Alternative 3: Modified Subdivision*
- *Alternative 4: Reduced Density*
- *Alternative 5: Clustered Design*

Refer to Section 6.0, *Alternatives,* for descriptions and analyses of these alternatives.

SUMMARY OF IMPACTS AND MITIGATION MEASURES

Table ES-1 includes a brief description of the environmental issues relative to the proposed project, the identified environmental impacts, proposed mitigation measures, and residual impacts. Impacts are categorized by significance. *Significant and unavoidable* adverse impacts (Class I) require a statement of overriding considerations to be issued per Section 15093 of the *State CEQA Guidelines* if the project is approved. *Significant but mitigable* impacts (Class II) are adverse impacts that can be feasibly mitigated to less than significant levels and which require findings to be made under Section 15091 of the *State CEQA Guidelines*. *Less than significant* impacts (Class III) would not exceed significance thresholds and therefore would not require mitigation.

Table ES-1
Summary of Significant Environmental Impacts, Mitigation Measures, and Residual Impacts

Impact	Mitigation Measure	Residual Impact
AESTHETICS		
Impact AES-1 Carmel Valley Road, designated as a prime viewing corridor by the County of Monterey, provides a brief viewing corridor of the project site. However, views accessed by Road travelers would be brief and no scenic vista would be blocked or significantly altered. Impacts would be Class II, *less than significant*.	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact AES-2 The proposed project would convert the existing rural character of the site to a more urban character. However, the project location makes it a natural extension of the existing urban landscape of lower Carmel Valley. By adhering to the CVMP policy CV-1.1, the development would maintain the rural character of the region and thus would not degrade the existing visual character or quality of the site. Impacts would be Class III, less than significant.	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact AES-3 The proposed project would introduce new sources of light to the project area. Impacts would be Class II, significant but mitigable.	**Downcast Lighting**. All street lighting and exterior lighting on residences shall be downcast with full cutoff fixtures and low mounted to reduce light trespass onto adjacent properties. The proposed lighting plan shall be submitted to and approved by the Monterey County RMA – Planning Department prior to issuance of grading permits.	Implementation of Mitigation Measure AES-3 would reduce nighttime lighting-related impacts to a less than significant level.
AIR QUALITY		
Impact AQ-1 The proposed project would introduce additional housing to the area and contribute to population growth. However, growth would be within the growth assumptions of the 2008 AQMP. This impact would be Class III, *less than significant*.	No mitigation is required.	Impacts would be less than significant without mitigation.

Table ES-1
Summary of Significant Environmental Impacts, Mitigation Measures, and Residual Impacts

Impact	Mitigation Measure	Residual Impact
Impact AQ-2 Construction of the proposed project would result in the temporary generation of air pollutants, which would affect local air quality. The emissions would be short term and no criteria pollutants would exceed MBARD thresholds. Impacts would be Class III, *less than significant.*	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact AQ-3 Operational emissions would not exceed MBARD's daily thresholds. Impacts would be Class II, *less than significant.*	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact AQ-4 The proposed project would not degrade service levels at study area intersections such that CO hotspots would be created. Impacts related to CO hotspots would be Class III, *less than significant.*	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact AQ-5 The project would not expose sensitive receptors to substantial pollutant concentrations associated with construction dust or toxic air contaminants. Impacts related to these localized pollutants would be Class III, *less than significant.*	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact AQ-6 The proposed project would not create objectionable odors that would affect neighboring properties. Impacts related to odors would be Class III, *less than significant.*	No mitigation is required.	Impacts would be less than significant without mitigation.
BIOLOGICAL RESOURCES		
Impact B-1 Implementation of the proposed project would impact special status animal species. Potential impacts to special status animal species are Class II, significant but	**B-1(a) California Red-legged Frog (CRLF) Pre-construction Survey and Impact Avoidance.** The following measures shall be implemented during construction of the proposed project. • Water shall not be impounded in a manner that may attract CRLF. • All food-related garbage shall be placed in tightly sealed containers at the end of each workday to avoid	Implementation of Mitigation Measures B-1(a) through B-1(e) would reduce impacts to special status animals to a less than significant level.

Table ES-1
Summary of Significant Environmental Impacts, Mitigation Measures, and Residual Impacts

Impact	Mitigation Measure	Residual Impact
mitigable.	attracting predators. Containers shall be emptied and garbage removed from the construction site at the end of each workweek. If sealed containers are not available, garbage shall be removed from the construction site upon completion of daily activities. All garbage removed from the construction site shall be disposed of at an appropriate off-site refuse location • Not less than 14 days prior to the start of any construction activities, including staging and mobilization, a qualified biologist shall conduct pre-construction surveys within suitable upland habitat on-site. If no CRLF are observed, no further mitigation is necessary. • Pets shall be prohibited at the construction site. **B-1(b) USFWS Consultation.** If CRLF, during any life stages, are identified within the work area and impacts to individuals cannot be avoided, construction and grading in these areas shall be halted, and the County and USFWS shall be contacted immediately to initiate FESA Consultation. No CRLF shall be captured and relocated without expressed permission from USFWS. **B-1(c) Worker Environmental Awareness Training (WEAP).** Prior to initiation of construction activities, including staging and mobilization, all personnel associated with project construction shall attend WEAP training, conducted by a qualified biologist, to aid workers in recognizing special status species and sensitive biological resources that may occur on-site. The program shall include identification of the special status species and their habitats, a description of the regulatory status and general ecological characteristics of sensitive resources, and review of the limits of construction and mitigation measures required to reduce impacts to biological resources within the work area. A fact sheet conveying this information shall also be prepared for distribution to all contractors, their employers, and other personnel involved with construction of the project. All employees shall sign a form documenting that they have attended the WEAP and understand the information presented to them. The form(s) shall be submitted to the implementing agency to document compliance. **B-1(d) Monterey dusky-footed Woodrat Pre-construction Survey and Impact Avoidance.** If feasible, vegetation removal shall be conducted when woodrats are least likely to breed in October through November. No more than 30 days prior to construction, a qualified biologist shall conduct a pre-construction survey for Monterey dusky-footed woodrat middens within 50 feet of the work limits. At the discretion of a qualified biologist, an exclusion buffer shall be established around any woodrat middens that can be avoided, and these exclusion zones shall be fenced as	

Table ES-1
Summary of Significant Environmental Impacts, Mitigation Measures, and Residual Impacts

Impact	Mitigation Measure	Residual Impact
	Environmentally Sensitive Areas to protect the nest. If a woodrat midden cannot be avoided, potential dismantling and relocation strategies shall be developed and presented to the CDFW by a qualified biologist for review and/or approval. **B-1(e) White-tailed kite Survey and Impact Avoidance.** Surveys for white-tailed kites shall be conducted by a qualified biologist no more than 14 days prior to initiation of any construction activities, including construction staging and vegetation removal. The surveys shall include the entire disturbance areas plus a 200-foot buffer around any disturbance areas. If no white-tailed kite active nests or roosts are observed, no further mitigation is necessary. If present, white-tailed kite active nest sites and roots shall be fully avoided. Full avoidance shall be documented by regular site visits by a qualified biologist. These site visits shall be documented in a report submitted to the County for verification that the project complies with full avoidance of nests or roosts. The monitoring and report documentation shall continue for the duration of the project or until the nests or roosts are no longer active. **B-1(f) Burrowing Owl Avoidance and Minimization.** Pre-construction surveys shall be conducted for burrowing owls in accordance with CDFW-adopted survey protocols (California Burrowing Owl Consortium, 1993). This could entail surveys for winter residents in December and January, in addition to peak nesting season (April 15 through July 15) surveys. All suitable habitat, potential or known burrows, or burrowing owls identified on-site shall be assessed and mapped. Survey results shall be valid only for the season during which the survey is conducted. Surveys shall cover all suitable habitats on-site plus a 500-foot buffer where feasible. If no burrowing owls or habitats are detected, no further action is required. If, during pre-construction surveys, burrowing owls are detected on-site or within the survey area, all burrowing owls and occupied burrows shall be counted, mapped as stated above, and avoided by establishing a buffer around the occupied burrow(s). The buffer shall be a minimum of 300 feet around nest burrows and 100 feet around non-nest burrows. Buffers shall be demarcated with highly visible construction fencing and no ground disturbance activities shall occur within this buffer until the qualified biologist has determined that the burrow is no longer occupied. If an occupied burrow cannot be avoided, passive relocation may be implemented by a qualified biologist with guidance from the CDFW. No burrowing owls may be trapped. Passive relocation shall be limited to the non-breeding season, typically between April 15 and July 15. Passive relocation may involve installation of one-way doors at burrow entrances for a minimum of five days. Once the qualified biologist has determined that the burrow is no longer occupied, the	

Table ES-1
Summary of Significant Environmental Impacts,
Mitigation Measures, and Residual Impacts

Impact	Mitigation Measure	Residual Impact
	burrow may be hand excavated to prevent re-occupancy.	
Impact B-2 Construction of the proposed project could directly impact nesting raptors and other avian species protected under existing regulations by causing injury, death, or nest failure. Potential impacts to nesting birds are Class II, significant but mitigable.	**B-2 Pre-construction Surveys for Nesting Birds and Raptors**. For construction activities occurring during the nesting season (generally February 1 to September 15), surveys for nesting birds and raptors covered by the CFC and the MBTA (including, but not limited to special status species including the white-tailed kite) shall be conducted by a qualified biologist no more than 14 days prior to initiation of any construction activities, including construction staging and vegetation removal. The surveys shall include the entire disturbance areas plus a 200-foot buffer around any disturbance areas. If active nests are located, all construction work shall be conducted outside a buffer zone from the nest to be determined by the qualified biologist. The buffer shall be a minimum of 50 feet for non-raptor bird species and at least 150 feet for raptor species. Larger buffers may be required depending upon the status of the nest and the construction activities occurring in the vicinity of the nest. The biologist shall have full discretion for establishing a suitable buffer. The buffer area(s) shall be closed to all construction personnel and equipment until the adults and young are no longer reliant on the nest site. A qualified biologist shall confirm that breeding/nesting is completed and young have fledged the nest prior to removal of the buffer.	Implementation of Mitigation Measure B-2 would reduce impacts to special status animals to a less than significant level.
Impact B-3 Construction of the proposed project may require removal of one on-site redwood tree, which is protected under CVMP Policy CV-3.11 and Monterey County Code Section 21.64.260. Pursuant to receipt of a tree removal permit, the project would not conflict with either policy or ordinance. Therefore, potential impacts would be Class III, *less than significant*.	No mitigation is required.	Impacts would be less than significant.
CLIMATE CHANGE		
Impact CC-1 The proposed project would generate greenhouse gas emissions during construction and operation. Greenhouse gas emissions from the project would not exceed accepted thresholds. Impacts would be Class III, less than significant.	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact CC-2 The proposed project would	No mitigation is required.	Impacts would be less than significant without

Table ES-1
Summary of Significant Environmental Impacts, Mitigation Measures, and Residual Impacts

Impact	Mitigation Measure	Residual Impact
not conflict with State GHG reduction goals, or any applicable plan, policy, or regulation adopted for the purpose of reducing GHG emissions. Impacts would be Class III, less than significant.		mitigation.
CULTURAL RESOURCES		
Impact CR-1 The project site contains a single-family residence and garage, constructed in 1958 and 1962, respectively. Both structures, which would be removed as a result of the project, lack architectural integrity and are not considered historical resources. Therefore, impacts would be Class III, *less than significant.*	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact CR-2 Construction of the proposed project would involve surface excavation, which has the potential to unearth or adversely impact previously unidentified archaeological resources. Impacts would be Class II, *significant but mitigable.*	**CR-2a On-Site Monitoring.** A professional archaeologist and an OCEN Tribal Monitor shall supervise soil disturbing activities such as demolition, excavation, and driveway removal. If at any time, potentially significant archaeological resources are discovered, the Tribal Monitor and/or the archaeologist shall be authorized to temporarily halt work until the find has been evaluated and, if determined significant, until mitigation measures have been formulated and implemented with the concurrence of the County. A sampling of soil may be screened during monitoring to facilitate resource identification and data recovery. At least two single specimen radiocarbon dates shall be obtained. Prior to issuance of any grading or building permits, a copy of a signed agreement between the applicant, archaeologist, and Tribal Monitor shall be submitted to County of Monterey RMA-Planning Department for review and approval. **CR-2b On-Site Pre-construction Meeting.** An on-site pre-construction meeting shall be held between the applicant, the archaeologist, and OCEN Tribal monitor, and the contractor to discuss and assure the understanding of the mitigation measures required and the scheduling of construction with regard to monitoring. Prior to issuance of any permits, a letter summarizing what was discussed at the pre-construction meeting between all parties shall be submitted to County of Monterey RMA-Planning. **CR-2c Unanticipated Discovery of Archaeological Remains.** If previously unidentified archaeological resources are encountered during construction or land disturbance activities, work shall stop within 50 feet of	Impacts would be less than significant with implementation of mitigation measures CR-2a through CR-2d.

Table ES-1
Summary of Significant Environmental Impacts,
Mitigation Measures, and Residual Impacts

Impact	Mitigation Measure	Residual Impact
	the find and the County of Monterey RMA – Planning Department shall be notified immediately to assess the nature, extent, and potential significance of the find. If archaeological resources are found, the applicant shall retain a qualified archaeologist to implement a Phase II subsurface testing program to determine the resource boundaries, assess the integrity of the resource, and evaluate the resource's significance through a study of its features and artifacts. If the resource is determined not to be significant, no capping and/or further archaeological investigation or mitigation shall be required. If the resource is determined to be significant, the County of Monterey may choose to allow the capping of the area containing the resource using culturally sterile and chemically neutral fill material. If such capping occurs, then a qualified archaeologist shall be retained to monitor the placement of fill upon the resource. If a significant resource will not be capped, the results and recommendations of the Phase II study shall determine the need for a Phase III data recovery program designed to record and remove significant cultural materials that could otherwise be tampered with. The results and recommendations of the Phase II study shall determine the need for construction monitoring. If monitoring is warranted, a qualified archaeologist shall be retained by the applicant to be present during all earth moving activities that have the potential to affect archaeological or historical resources. A monitoring report shall be submitted to the County upon completion of construction. **CR-2d** The text of mitigation measures CR-2a through CR-2c shall be posted and maintained at the project site for the duration of construction.	
Impact CR-3 Construction of the proposed project would involve surface excavation. Although unlikely, these activities have the potential to unearth and/or impact paleontological resources. Impacts would be Class II, *significant but mitigable*	**CR-3 Fossil Salvage.** If fossils are discovered, a qualified paleontologist or paleontological monitor shall recover them. In the case of a large fossil requiring extensive excavation, the paleontologist shall have the authority to temporarily direct, divert, or halt construction activity to ensure that the fossils(s) can be removed in a safe and timely manner. Once salvaged, fossils shall be identified to the lowest possible taxonomic level, prepared to a curation-ready condition and curated in a scientific institution with a permanent paleontological collection. The curation in a scientific institution shall include all pertinent field notes, photos, data, and maps.	Impacts would be less than significant with implementation of mitigation measure CR-3.
Impact CR-4 Construction of the proposed project would involve excavation, which has the potential to unearth or adversely impact previously unidentified human remains. Impacts would be Class III, *less than significant*.	No mitigation is required.	Impacts would be less than significant without mitigation.

Table ES-1
Summary of Significant Environmental Impacts, Mitigation Measures, and Residual Impacts

Impact	Mitigation Measure	Residual Impact
GEOLOGY/SOILS		
Impact GEO-1 Seismically induced ground shaking could destroy or damage structures and infrastructure, resulting in loss of property or risk to human safety. However, the project's mandatory compliance with applicable California Building Code requirements renders impacts Class III, less than significant.	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact GEO-2 Due to the depth of groundwater on the project site, the potential for seismic related ground failure from liquefaction of underlying soils is moderate. Impacts would be Class III, less than significant.	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact GEO-3 Construction of the proposed project could result in soil erosion or loss of topsoil. However, compliance with existing regulations would reduce impacts to a Class III, less than significant, level.	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact GEO-4 The project site is not located on a geologic unit or soil that is unstable, and would not result in landslides, lateral spreading, subsidence, collapse, or soil expansion. Impacts would be Class III, less than significant.	No mitigation is required.	Impacts would be less than significant without mitigation.
HAZARDS		
Impact HAZ-1 The proposed project would not involve the routine transport, use, or disposal of substantial amounts of hazardous substances. Impacts would be Class III, less than significant.	No mitigation is required.	Impacts would be less than significant without mitigation.

Table ES-1
Summary of Significant Environmental Impacts, Mitigation Measures, and Residual Impacts

Impact	Mitigation Measure	Residual Impact
Impact HAZ-2 The project would have the potential to expose workers to asbestos-containing materials and/or lead based paint during demolition of existing on-site structures. However, adherence to regulatory requirements would ensure that the impacts would be Class III, less than significant.	No mitigation is required.	Impacts would be less than significant without mitigation.
HAZ-3 Although no active listed hazardous materials sites listed pursuant to Government Code Section 65962.5 are located on the project site or within one-half mile of the site, disturbance of contaminated soils from prior agricultural use could create a significant hazard to the public or environment, including potential health hazards for construction workers or future residents and occupants of the site. Impacts would be Class II, significant but mitigable.	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact HAZ-4 Residential development on the project site would not occur near roadways on which accidents that involve hazardous materials could occur. In addition, required adherence to existing Federal and State laws and regulations would limit the potential for release of hazardous materials due to upset and accident conditions. Impacts would be Class III, less than significant level.	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact HAZ-5 The proposed project could result in the temporary emission of hazardous materials, substances or	No mitigation is required.	Impacts would be less than significant without mitigation.

Table ES-1
Summary of Significant Environmental Impacts, Mitigation Measures, and Residual Impacts

Impact	Mitigation Measure	Residual Impact
waste within one-quarter mile of an existing school. However, compliance with existing regulations would ensure that impacts remain Class III, less than significant.		
Impact HAZ-6 The project site is not located in an area subject to a high fire threat, and new development located on the project site would be required to comply with existing regulations intended to minimize the potential effects associated with wildfires. Impacts related to exposing people or structures to a significant risk of loss, injury, or death involving wildland fires would be Class III, less than significant.	No mitigation is required.	Impacts would be less than significant without mitigation.
HYDROLOGY AND WATER QUALITY		
Impact H-1 Construction of the proposed project could potentially result in an increase in pollutant discharges to waters of the State, but compliance with Monterey County 2010 General Plan and Carmel Valley Master Plan policies, as well as existing regulatory requirements, would help to reduce or avoid such impacts. Mitigation to reduce off-site runoff to the maximum extent feasible would ensure that the proposed project would not violate water quality standards or waste discharge requirements or otherwise degrade water quality. This impact would be Class II, significant but mitigable.	**H-1(a) Accidental Spill Control and Environmental Training**. Prior to the issuance of a grading permit, the applicant shall submit a Spill Response Plan and Spill Prevention, Control and Countermeasure Plan to the County of Monterey for review and approval. The Spill Response Plan (SRP) in combination with the Spill Prevention, Control and Countermeasure (SPCC) Plan to be prepared for the proposed project shall include procedures for quick and safe clean-up of accidental spills. The SRP and/or SPCC shall prescribe hazardous materials handling procedures for reducing the potential for a spill during construction, and shall include an emergency response program to ensure quick and safe clean-up of accidental spills. Additionally, an environmental training program shall be established to communicate environmental concerns and appropriate work practices, including spill prevention and response measures to all field personnel. A monitoring program shall be implemented to ensure that the plans are followed during all construction activities. **H-1(b) Maintain Vehicles and Equipment**. All vehicles and equipment, including all hydraulic hoses, shall be maintained in good working order to minimize leaks that could escape the vehicle or contact the ground. A vehicle and equipment maintenance log shall be updated and provided by the applicant to the County of Monterey RMA – Planning Department on a monthly basis for the duration of project construction. **H-1(c) Design-level Drainage Analysis and**	Implementation of Mitigation Measures H-1(a) through H-1(d) would reduce impacts to a less than significant level.

Table ES-1
Summary of Significant Environmental Impacts, Mitigation Measures, and Residual Impacts

Impact	Mitigation Measure	Residual Impact
	Minimization of Runoff. The applicant shall conduct a design-level drainage analysis prior to issuance of a construction permit that shall identify existing drainage patterns across the project site and existing off-site stormwater discharge locations. The drainage analysis shall quantify, to the extent feasible, the existing and predicted post-construction peak runoff rates and amounts both on-site and off-site immediately downgradient of the project site. The drainage analysis shall identify any changes to the location of down-gradient discharge of stormwater runoff and any potential impacts on off-site property that would result from those changes. Stormwater control measures shall be developed to maximize on-site infiltration of stormwater and minimize off-site stormwater discharge. These stormwater control measures shall be designed to achieve conformance with Monterey County General Plan Safety Element Policy S-3.1 such that post-development, off-site peak flow drainage from the project site would not be greater than pre-development peak flow drainage. The stormwater control measures may include, as necessary, above-ground retention and/or detention basins, stormwater collection tanks, subsurface infiltration devices such as cisterns with permeable bottoms or perforated pipes, permeable pavement, and vegetated swales. The stormwater control measures required by this mitigation may be used, in whole or in part, to satisfy the erosion and runoff control standards of the NPDES-required SWPPP and the Monterey County Code-required erosion control plan. The design-level drainage analysis shall be submitted to and approved by Monterey County RMA – Public Works, Monterey County RMA – Environmental Services, and Monterey County Water Resources Agency prior to issuance of construction permits. The identified stormwater control measures shall be installed prior to issuance of occupancy permits. **H-1(d) Stormwater Control Plan, Operation and Maintenance Plan, and Maintenance Agreements**. Prior to issuance of construction permits, the applicant shall submit a Stormwater Control Plan, prepared by a registered professional engineer, addressing the Post-Construction Stormwater Management Requirements (PCRs) for Development Projects in the Central Coast Region. The plan shall include the location of the drainage facilities and construction details. A report with supporting calculations shall also be provided. The Stormwater Control Plan shall be reviewed by a licensed Geotechnical Engineer to ensure conformance with the Geotechnical Investigation or Engineering Geology Report. Prior to issuance of construction permits, the applicant shall submit an Operation and Maintenance Plan to RMA Environmental Services for review and approval. The plan shall be prepared by a registered Professional Engineer and include, at a minimum, the	

Table ES-1
Summary of Significant Environmental Impacts, Mitigation Measures, and Residual Impacts

Impact	Mitigation Measure	Residual Impact
	following: a) a site map identifying all structural Stormwater Control Measures requiring O&M practices to function as designed, b) O&M procedures for each structural Stormwater Control Measure including, but not limited to, LID facilities, retention/detention basins, and proprietorship devices, and c) the O&M plan shall include short- and long-term maintenance requirements, recommended frequency of maintenance, and estimated cost for maintenance. Prior to issuance of construction permits, the applicant shall enter into a Maintenance Agreement (Agreement) with Monterey County. The applicant shall submit a signed and notarized agreement to RMA Environmental Services for review and approval. The agreement shall clearly identify the responsible party for ongoing maintenance of structural Stormwater Control Measures. The Agreement shall contain provisions for an annual report to be prepared by a registered Professional Engineer. The annual report shall be submitted to RMA Environmental Services, for review and approval, no later than August 15th. All recommended maintenance shall be completed by October 15th of that same year. If maintenance is required, certification shall be provided that all recommended maintenance has been completed before the start of the rainy season.	
Impact H-2 Net consumptive use of groundwater for the proposed project would be less than the baseline consumptive use and would not result in a net deficit in aquifer volume or a lowering of the local groundwater table level. Sufficient water supplies are available to serve the project from existing entitlements and resources. Impacts would be Class III, less than significant.	No mitigation is required.	Impacts would be less than significant.
Impact H-3 Construction and operation of the proposed project would alter the on-site topography and increase the amount of on-site impervious surface, which could increase the rate and amount of on- and off-site runoff and result in erosion, flooding, and the need for expanded stormwater drainage facilities. Compliance with existing regulations and	Mitigation Measure H-1(c) would ensure that the amount and rate of on- and off-site stormwater runoff would be reduced to the maximum extent feasible. No additional mitigation is required.	Implementation of Mitigation Measure H-1(c) would reduce impacts to a less than significant level.

Table ES-1
Summary of Significant Environmental Impacts, Mitigation Measures, and Residual Impacts

Impact	Mitigation Measure	Residual Impact
policies would help to reduce or avoid such impacts. Mitigation to reduce off-site runoff to the maximum extent feasible would ensure that the proposed project would not result in on- or off-site erosion or flooding or the need for expanded stormwater drainage facilities. This impact would be Class II, significant but mitigable.		
Impact H-4 Construction and operation of the proposed project would place housing within a 100-year flood hazard area which could result in the impedance or redirection of flood flows and the exposure of people and structures to a significant risk of loss, injury, or death involving flooding. Project design features would help to reduce flood risk. Mitigation would further reduce the risk of loss, injury, or death involving flooding. This impact would be Class II, *significant but mitigable*.	Mitigation Measure H-1(c), combined with Mitigation Measure H-4 below, are required to ensure that on-site structures and people are protected from a significant risk of loss, injury, or death involving flooding and to ensure that the amount and rate of on- and off-site stormwater runoff would be reduced to the maximum extent feasible. **H-4 Protect Project Structures and Residents from Flood-related Loss, Injury, or Death.** The applicant shall design the project and all on-site structures in a manner that reduces the exposure to loss, injury, or death involving flooding to the maximum extent feasible. Prior to issuance of grading permits, the applicant shall submit a description of proposed flood control measures for review and approval. Measures can include on-site improvements, off-site improvements, or a combination of on- and off-site improvements. Examples of on-site improvements include: • Raising building foundations above the base flood elevation • Designing roadways in such a way that they serve as effective levees • Providing on-site flood capture systems that would intercept and infiltrate flood flows up-gradient of all on-site structures • Providing on-site drainage facilities to route flood flows around project structures (provided that those on-site drainage facilities do not result in a post-development discharge of runoff that would exceed pre-development levels) Examples of off-site improvements include: • Contribution to, and confirmation of, concrete plans for the implementation of regional flood mitigation strategies. Examples of regional flood mitigation strategies relevant to the project site include: o Installation of an upstream conduit to capture DA-27 flood flows and route those flows to the Carmel River (extension further to the north of an 84-inch drainage pipe as proposed by the Rancho Canada Village Project would address this requirement).	Implementation of Mitigation Measures H-1(c) and H-4 would reduce impacts to a less than significant level.

Table ES-1
Summary of Significant Environmental Impacts,
Mitigation Measures, and Residual Impacts

Impact	Mitigation Measure	Residual Impact
	o Raising the elevation of Val Verde Drive sufficiently to protect the project site from the DA-27 overland flows, provided that those re-directed flood flows do not adversely affect off-site properties. In the case where the applicant chooses to contribute to regional flood mitigation strategies, the applicant shall confirm with the County or appropriate resource agency that those improvements would be constructed prior to the issuance of occupancy permits. If the applicant chooses not to contribute to regional flood mitigation strategies, then the applicant must implement one or more of the on-site improvements listed above such that the exposure to loss, injury, or death involving flooding (including project-induced off-site flooding) would be reduced to the maximum extent feasible. The applicant shall submit the proposed flood protection measures to Monterey County RMA – Public Works, Monterey County RMA – Environmental Services, and Monterey County Water Resources Agency for approval prior to issuance of grading permits. The submittal shall clearly demonstrate that all on-site habitable structures would be raised above the base flood elevation or would be fully protected from DA-27 flood waters produced during the 100-year storm event.	
LAND USE AND PLANNING		
Impact LU-1 The project would not physically divide an established community. Impacts would be Class III, less than significant.	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact LU-2 Based on the current project design and following implementation of the mitigation measures identified throughout this EIR, the proposed project would be generally consistent with applicable policies of the Monterey County 2010 General Plan and the supplemental policies of the CVMP. This would be a Class II, significant but mitigable, environmental impact.	Mitigation measures identified throughout this EIR would serve to reduce identified environmental impacts and further improve consistency of the project with certain General Plan policies. However, no specific mitigation for this impact is required.	With implementation of mitigation measures identified throughout this EIR, impacts would be reduced to a less than significant level.
NOISE		
Impact N-1 Noise from demolition of existing structures, excavation and grading, and construction of the project and associated	**N-1(a)** Construction Equipment. Construction equipment shall be properly maintained and all internal combustion engine driven machinery with intake and exhaust mufflers and engine shrouds, as applicable, shall be in good condition and appropriate for the equipment. Equipment engine shrouds shall be closed during	Implementation of Mitigation Measures N-1(a) through N-1(e) would reduce construction noise impacts to a less than significant level.

Table ES-1
Summary of Significant Environmental Impacts, Mitigation Measures, and Residual Impacts

Impact	Mitigation Measure	Residual Impact
infrastructure has the potential to adversely impact existing and future nearby residences. Impacts would be Class II, significant but mitigable.	equipment operation. Whenever feasible, electrical power shall be used to run air compressors and similar power tools rather than diesel equipment. The developer shall require all contractors, as a condition of contract, to maintain and tune-up all construction equipment to minimize noise emissions. **N-1(b)** Vehicle and Equipment Idling. Construction vehicles and equipment shall not be left idling for longer than five minutes when not in use. **N-1(c)** Stationary Equipment. Stationary construction equipment that generates noise that exceeds 60 dBA Leq at the boundaries of the nearby residential uses shall be shielded. Temporary noise barriers used during construction activity shall be made of noise-resistant material sufficient to achieve a Sound Transmission Class (STC) rating of STC 40 or greater, based on sound transmission loss data taken according to ASTM Test Method E90. Such a barrier may provide as much as a 10 dB insertion loss, provided it is positioned as close as possible to the noise source or to the receptors. To be effective, the barrier must be long and tall enough (a minimum height of eight feet) to completely block the line-of-sight between the noise source and the receptors. The gaps between adjacent panels must be filled-in to avoid having noise penetrate directly through the barrier. The recommended minimum noise barrier or sound blanket requirements would reduce construction noise levels by at least 10 dB. The equipment area with appropriate acoustical shielding shall be designated on building and grading plans. Equipment and shielding shall remain in the designated location throughout construction activities. Prior to issuance of grading permits, the project proponent shall submit building and grading plans that show the appropriate construction equipment noise reduction measures to the RMA – Planning Department. Compliance shall be monitored by County Building Inspectors. **N-1(d)** Workers' Radios. All noise from workers' radios shall be controlled to a point that they are not audible at sensitive receptors near the construction activity. **N-1(e)** Disturbance Coordinator. A noise disturbance coordinator shall be designated by the contractor. The noise disturbance coordinator shall be responsible for responding to any local complaints about construction noise. The noise disturbance coordinator shall determine the cause of the noise complaint (e.g., starting too early, bad muffler, etc.) and shall require that reasonable measures warranted to correct the problem be implemented. A telephone number for the disturbance coordinator shall be conspicuously posted at the construction site.	

Table ES-1
Summary of Significant Environmental Impacts, Mitigation Measures, and Residual Impacts

Impact	Mitigation Measure	Residual Impact
Impact N-2 Construction-related activities associated with the proposed project would intermittently generate groundborne vibration on and adjacent to the site. This may affect existing off-site receptors near the project site and proposed on-site residences, but would not create vibrations that could cause structural damage to adjacent structures within 100 feet of the project site. Impacts would be Class III, less than significant.	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact N-3 Occupants of proposed on-site and existing off-site residential units would not experience noise level increases exceeding applicable thresholds as a result of project-generated traffic on Highway 1, Carmel Valley Road, Val Verde Drive, Rio Road, or Carmel Rancho Boulevard. Project-generated traffic would have a less than significant impact on exterior and interior noise levels at existing and proposed sensitive receptors on Val Verde Drive. Impacts would be Class III, less than significant.	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact N-4 The proposed residential uses would be subject to operational noise generated from existing commercial operations west of the site, as well as noise generated from outdoor activities and operations on nearby school playgrounds. However, noise generated by these uses would not exceed applicable standards. The project would also	No mitigation is required.	Impacts would be less than significant without mitigation.

Table ES-1
Summary of Significant Environmental Impacts,
Mitigation Measures, and Residual Impacts

Impact	Mitigation Measure	Residual Impact
generate additional noise from operation of the proposed residential uses. These noise impacts would not cause the applicable standards to be exceeded for any nearby uses. Impacts would be Class II, *less than significant*.		
POPULATION AND HOUSING		
Impact PH-1 Implementation of the proposed project would induce population and housing growth in the immediate area. The increases are within the AMBAG and Monterey County General Plan projections; therefore, impacts related to population growth would be Class III, less than significant.	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact PH-2 The proposed project would increase the housing stock. Impacts related to the displacement of housing and people would be Class III, less than significant.	No mitigation is required.	Impacts would be less than significant without mitigation.
PUBLIC SERVICES		
Impact PS-1 The proposed project would place increased demands on fire protection services, but would not create the need for new or expanded fire protection facilities. Impacts would be Class III, less than significant.	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact PS-2 The proposed project would generate new residents that would require police protection services. This increase in service population would not increase response times beyond acceptable levels and would not require additional police staff or vehicles such that new or expanded police facilities	No mitigation is required.	Impacts would be less than significant without mitigation.

Table ES-1
Summary of Significant Environmental Impacts,
Mitigation Measures, and Residual Impacts

Impact	Mitigation Measure	Residual Impact
would need to be constructed. Therefore, impacts would be Class III, *less than significant.*		
Impact PS-3 The proposed project would generate an estimated five elementary, middle, and high school students. Students generated by the project would attend Carmel River Elementary School, Carmel Middle School, and Carmel High School, none of which would be required to operate above capacity as a result of the project. Therefore, implementation of the proposed project would not require construction of new or physically altered educational facilities. Impacts to schools would be Class III, *less than significant*.	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact PS-4 The proposed project would generate new residences that may utilize the Harrison Memorial Library and/or the Carmel Valley Branch Library. However, this increase in population would not trigger the need to construct new library facilities or altered library facilities. Therefore, Impacts would be Class III, less than significant.	No mitigation is required.	Impacts would be less than significant without mitigation.
RECREATION		
Impact REC-1 The proposed project would generate demand for parkland. However, adequate parkland in the County and in the vicinity of the project site is available to meet this demand. As such, the construction of new facilities would not be required, and substantial physical deterioration of existing facilities would not occur. Impacts would	No mitigation is required.	Impacts would be less than significant without mitigation.

Table ES-1
Summary of Significant Environmental Impacts,
Mitigation Measures, and Residual Impacts

Impact	Mitigation Measure	Residual Impact
be Class III, less than significant.		
TRAFFIC		
Impact T-1 The proposed project would result in potentially significant impacts to three study intersections and two study road segments under Existing plus Project conditions. Planned improvements and required mitigation would potentially eliminate some of these impacts; however, funding and timing of these improvements cannot be guaranteed. In addition, mitigation for one intersection and two road segments is not feasible. Therefore, project impacts under Existing plus Project conditions would be Class I, significant and unavoidable.	Based on the impact analysis in the TIA and summarized above, three intersections and two roadway segments require mitigation under Existing plus Project conditions. This includes intersections #3, #7, and #8, and road segments #1 and #3. The TAMC Regional Transportation Plan (RTP) includes a list of projects to improve traffic operations within the project study area. Planned improvements include: 1. Add a second northbound through lane on Highway 1 between Rio Road and Carmel Valley Road 2. Highway 1/Rio Road Intersection: a. Convert the northbound right-turn lane to a shared through/right-turn lane b. Add a second westbound right-turn lane c. Add an exclusive southbound right-turn lane 3. Highway 1/Carmel Valley Road Intersection: a. Convert the northbound right-turn lane to a shared through/right-turn lane The above planned improvements would eliminate the proposed project's impact to intersection #3 (Highway 1/Rio Road) and road segment #3 (Highway 1 between Carmel Valley Road and Rio Road) in the northbound direction. Project-specific impacts to intersection #8 (Highway 1/Carpenter Street) and segment #1 (Highway 1 between Carpenter Street and Ocean Avenue) in the northbound direction could potentially be reduced with the addition of a northbound right-turn lane at Highway 1 and Carpenter Street. However, as intersection #8 and road segment #1 both operate deficiently without the project, the project applicant would be responsible for a fair share contribution only. As shown in Figure 4.11-4, the project's contribution to this intersection would be seven trips during the AM peak hour and nine trips during the PM peak hour, none of which would turn right from Highway 1 onto Carpenter Street. The improvement is not planned within the TAMC RTP or other regional document, and there is no funding established for this improvement. Thus, there is no mechanism into which the applicant could pay a fair share to ensure the improvement is constructed. Further, the improvement would be within Caltrans jurisdiction, and would therefore be beyond the control of the project applicant and/or the County of Monterey. For these reasons, this TIA-identified mitigation is considered infeasible and is not included herein. It should also be noted that, with such an improvement, LOS D operations would continue at intersection #8: a northbound right-turn lane would reduce delays to pre-project conditions, but would not improve operations to an acceptable LOS.	Project impacts to the following intersections and road segments would remain significant and unavoidable under the Existing plus Project conditions: • Intersection #3 • Intersection #7 • Intersection #8 • Road segment #1 (northbound and southbound) • Road segment #3 (northbound and southbound)
Impact T-2 Implementation of the proposed project would	Based on the impact analysis in the TIA and summarized above, three intersections and five roadway segments require mitigation under Background plus	Project impacts to the following intersections and road segments would

Table ES-1
Summary of Significant Environmental Impacts, Mitigation Measures, and Residual Impacts

Impact	Mitigation Measure	Residual Impact
result in potentially significant impacts to three study intersections and five study road segments under Background plus Project conditions. Planned improvements and required mitigation would potentially eliminate some of these impacts; however, funding and timing of these improvements cannot be guaranteed. In addition, mitigation for one intersection and five road segments is not feasible. Therefore, project impacts under Background plus Project conditions would be Class I, significant and unavoidable.	Project conditions. This includes intersections #3, #7, and #8, and road segments #1, #2, #3, #6, and #7. As described previously, the TAMC RTP includes a list of projects to improve traffic operations within the project study area that would eliminate the proposed project's impact to intersection #3 (Highway 1/Rio Road) and road segment #3 (Highway 1 between Carmel Valley Road and Rio Road) in the northbound direction. While the addition of a northbound right-turn lane at SR and Carpenter Street would eliminate project-specific impacts to intersection #8 (Highway 1/Carpenter Street) and segment #1 (Highway 1 between Carpenter Street and Ocean Avenue) in the northbound direction, this improvement is not considered feasible for the reasons described under *Mitigation Measures* for Impact T-1. No other mitigation is feasible to reduce project impacts under Background plus Project Conditions.	remain significant and unavoidable under Background plus Project conditions: • Intersection #3 • Intersection #7 • Intersection #8 • Road segment #1 (northbound and southbound) • Road segment #2 • Road segment #3 (northbound and southbound) • Road segment #6 • Road segment #7
Impact T-3 Implementation of the proposed project would result in potentially significant impacts to four study intersections and six study road segments under Cumulative plus Project conditions. Impacts to all four intersections and four of the road segments would be less than significant upon payment of regional traffic impact fees. However, impacts to the remaining two road segments cannot be mitigated. Therefore, project impacts under Cumulative plus Project conditions would be Class I, significant and unavoidable.	Based on the impact analysis in the TIA and summarized above, four intersections and six roadway segments require mitigation under Background plus Project conditions. This includes intersections #1, #3, #7, and #8, and road segments #1, #2, #3, #6, #7, and #13. The TAMC RTP includes a list of projects to improve traffic operations within the project study area that would eliminate the proposed project's impact to intersections #1 (Highway 1/Carmel Valley Road) and #3 (Highway 1/Rio Road). As described previously, the construction of these planned improvements is dependent on STIP funding, which cannot be guaranteed. In addition, there are no planned or feasible improvements to mitigate impacts to intersections #7 (Highway 1/Ocean Avenue) and #8 (Highway 1/Carpenter Avenue). However, both TAMC and Caltrans consider payment of regional development impact fees as adequate mitigation for cumulative impacts to state highways and the regional road network. The project applicant would be required to pay regional fees to the CVTIP, TAMC, and Monterey County, as described under *Funding for Transportation Improvements* in Section 4.14.7(a) (Methodology and Significance Thresholds). Because payment of these fees is required and would mitigate cumulative impacts, impacts to intersections under Cumulative plus Project conditions would be less than significant. For Highway 1 roadway segments – which include study segments #1, #2, and #3 – payment of regional fees would similarly reduce project impacts to a less than significant level. For segments #6 and #7, impacts would be eliminated by widening Carmel Valley Road to four lanes. However, this improvement is not considered feasible and is therefore not required as mitigation. For segment #13, project impacts would be eliminated	Impacts to all four impacted intersections (#1, #3, #7, and #8) and road segments #1, #2, #3, and #13 would be less than significant upon payment of regional traffic impact fees. Impacts to segments #6 and #7 would remain significant and unavoidable.

Table ES-1
Summary of Significant Environmental Impacts,
Mitigation Measures, and Residual Impacts

Impact	Mitigation Measure	Residual Impact
	with planned improvements in the TAMC RTP. No further mitigation is required.	
UTILITIES		
Impact U-1 The proposed project would generate approximately 4,650 gallons per day (GPD) of wastewater, which could be accommodated within the existing capacity of the CAWD Water Pollution Control Plant. Impacts would be Class III, less than significant.	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact U-2 A new sewer connection would be required from the project site to the existing CAWD sewer line beneath Rio Road. Additionally, two existing groundwater production wells would provide potable water to the site. Impacts would be Class II, significant but mitigable.	**U-2 New Sewer Line**. New Sewer Line. The applicant shall construct a new sewer line to connect to the CAWD sewer system. The new sewer line shall run from the project site south down the centerline of Val Verde Drive to Rio Road. The piping within Val Verde Road shall measure 12 inches in diameter. At Rio Road, the new sewer line shall turn 90 degrees to the west and transition to 24 inch diameter piping. Manhole access shall be provided. The new 24 inch sewer line shall then run approximately 300 feet west under Rio Road to connect with the CAWD sewer line at an existing man hole in Rio Road. The required sizing is subject to Mitigation Measure O-1 in Section 5.0, *Other CEQA Required Sections*. Design of the new sewer connection shall be submitted to and approved by Monterey County RMA – Public Works and CAWD prior to issuance of grading permits. The new connection shall be installed prior to issuance of occupancy permits.	Implementation of Mitigation Measure U-2 would result in temporary construction impacts, since the installation of the required new sewer line beneath Val Verde Drive and Rio Road would require the operation of heavy equipment. This construction activity would result in increased emissions and potential noise and air quality impacts. However, the emissions associated with the implementation of Mitigation Measure U-2 are not expected to exceed and air quality thresholds or result in a cumulatively considerable net increase of any criteria pollutant. Construction activities would be limited to standard daytime hours and would comply with adopted noise standards. Finally, the new sewer line and man hole required by Mitigation Measure U-2 would be constructed entirely within the existing roadways of Val Verde Drive and Rio Road. Therefore, impacts related to agricultural resources, biological and cultural resources, and geology and soils would be less than significant. Because the sewer line would be constructed within existing

Table ES-1
Summary of Significant Environmental Impacts, Mitigation Measures, and Residual Impacts

Impact	Mitigation Measure	Residual Impact
		rights-of-way, long-term effects of the required sewer line, such as aesthetics and drainage, would be less than significant.
Impact U-3 The amount of solid waste that would be generated during construction and operation of the proposed project would not exceed the surplus capacity of the landfill serving the site. Impacts would be Class III, less than significant.	No mitigation is required.	Impacts would be less than significant without mitigation.

1.0 INTRODUCTION

This document is an Environmental Impact Report (EIR) that evaluates the proposed Carmel Rio Road project located in the County of Monterey, California. This section describes: (1) the purpose and legal authority of the EIR; (2) the scope and content of the EIR; (3) lead, responsible, and trustee agencies; and (4) the environmental review process required under the California Environmental Quality Act (CEQA).

1.1 PURPOSE AND LEGAL AUTHORITY

The proposed project requires the discretionary approval of County of Monterey as well as potential approvals (both discretionary and ministerial in nature) from other public agencies. Therefore, it is subject to the requirements of CEQA. In accordance with Section 15121 of the *State CEQA Guidelines,* the purpose of this EIR is to serve as an informational document that:

> *"...will inform public agency decision-makers and the public generally of the significant environmental effects of a project, identify possible ways to minimize the significant effects, and describe reasonable alternatives to the project."*

This EIR is to serve as an informational document for the public, the County of Monterey decision-makers, as well as any other public agencies that may have discretionary review over certain aspects of the project. The process will culminate with Board of Supervisors hearings to consider certification of a Final EIR and approval of the project.

1.2 EIR SCOPE AND CONTENT

In accordance with the *State CEQA Guidelines*, a Notice of Preparation (NOP) was distributed to affected agencies and the public for the required 30-day period from July 20, 2015 to August 19, 2015. A public scoping meeting was held in at St. Phillips Lutheran Church in Carmel Valley on July 30, 2015, to receive comments on the scope of the EIR for the proposed project. The intent of the scoping meeting was to provide interested individuals, groups, public agencies and others a forum to provide input to the County verbally in an effort to assist in further refining the intended scope and focus of the EIR. Seven individuals attended the scoping meeting, including the project applicant.

Table 1-1 summarizes the issues relevant to the EIR that were identified in the NOP comments received (three letters) and the EIR sections where the issues are addressed. The NOP and NOP comment letters received are included in the EIR in Appendix A.

Table 1-1
NOP Comment Issues

Issue	EIR Section
Monterey Bay Unified Air Pollution Control District (MBUAPCD) recommends using the MBUAPCD's *CEQA Guidelines,* the MBUPCD Consistency Procedures spreadsheet, and estimating emissions from the projects using CalEEMod.	The analysis in Section 4.2, *Air Quality,* was performed in conformance with the MBUAPCD's *CEQA Guidelines* using the Consistency Procedure spreadsheet and CalEEMod.
MBUAPCD recommends implementing design measures to minimize air quality and greenhouse gas impacts.	Refer to Sections 4.2, *Air Quality,* and 4.4, *Climate Change.*
The California Department of Transportation (Caltrans) recommends that the traffic study for the project be prepared in accordance with the Caltrans *Guide for Preparation of traffic Impact Studies* or technically comparable alternative.	Refer to the *Val Verde Subdivision Traffic Impact Analysis* (TIA) prepared by Hatch Mott MacDonald (June 2016), which is included in this EIR as Appendix I.
Caltrans recommends using a threshold of LOS C/D for State facilities.	A threshold of LOS C/D is used to assess impacts to Caltrans facilities. Refer to Section 4.14, *Transportation and Circulation.*
Caltrans recommends using the Association of Monterey Bay Area Governments (AMBAG) model for traffic analysis.	The AMBAG model is used for cumulative impacts. Refer to the *Val Verde Subdivision Traffic Impact Analysis* (TIA) prepared by Hatch Mott MacDonald (June 2016), which is included in this EIR as Appendix I, as well as Section 4.14, *Transportation and Circulation.*
Caltrans requests that the TIA include information on existing traffic volumes using counts less than two years old, and that the methodologies used to calculate the LOS should be consistent with the methods in the current version of the Highway Capacity Manual.	Refer to the *Val Verde Subdivision Traffic Impact Analysis* (TIA) prepared by Hatch Mott MacDonald (June 2016), which is included in this EIR as Appendix I.
The Monterey Peninsula Water Management District (MPWMD) notes that they are a responsible agency because a MPWMD Water Distribution System (WDS) Permit is required, as are Water Permits for each of the residential units.	Responsible agencies and permits required are discussed in Section 2.0, *Project Description.*
MPWMD requests that the hydrology and water quality chapter assess the effects of the change from agricultural irrigation to consumptive water service.	Refer to Section 4.8, *Hydrology and Water Quality.*
MPWMD notes that it previously determined that riparian rights have been documented for the proposed Water Distribution System (WDS) and that impacts to alluvial well owners would be less than significant.	Refer to Section 4.8, *Hydrology and Water Quality.*
MPWMD states that the amount of water available from the subject wells has not been formally distributed, and notes concerns about increases in water use on the site in recent years as it pertains to baseline water use.	Refer to Section 4.8, *Hydrology and Water Quality.*

In addition to the other environmental topic areas required under CEQA, this EIR addresses the issues determined to be potentially significant by responses to the NOP and scoping meetings

with the public and public agency staff. Environmental topic areas that are addressed in this EIR include:

- *Aesthetics*
- *Air Quality*
- *Biological Resources*
- *Climate Change*
- *Cultural Resources*
- *Geology and Soils*
- *Hazards and Hazardous Materials*
- *Hydrology and Water Quality*
- *Land Use and Planning*
- *Noise*
- *Public Services*
- *Recreation*
- *Transportation and Circulation*
- *Utilities and Service Systems*

This EIR addresses the environmental topic areas referenced above and identifies potentially significant environmental impacts, including both individual and cumulative impacts. In addition, the EIR recommends feasible mitigation measures that would reduce impacts to a level below thresholds of significance or eliminate adverse environmental effects when applicable.

The impact analyses contained in Section 4.0, *Environmental Impact Analysis,* of the EIR include a description of the physical and regulatory setting within each issue area, the methodologies used, followed by an analysis of the project's impacts. Each specific impact is called out separately and numbered, followed by an explanation of how the level of impact was determined. When appropriate, feasible mitigation measures to reduce significant impacts are included following the impact discussion. Measures are numbered to correspond to the impact that they mitigate. Finally, following the mitigation measures is a discussion of the residual impact that remains, if any, following implementation of recommended measures.

The *Alternatives* section of the EIR (Section 6.0) was prepared in accordance with Section 15126.6 of the *State CEQA Guidelines* and focuses on potentially feasible alternatives that are capable of eliminating or reducing significant adverse effects associated with the proposed project while feasibly attaining most of the project's basic objectives. Alternatives evaluated include the CEQA-required "No Project" scenario and three alternative development scenarios for the project site. The EIR also identifies the "environmentally superior" alternative among the options studied.

The level of detail contained throughout this EIR is consistent with the requirements of CEQA and applicable court decisions. The *State CEQA Guidelines* provide the standard of adequacy on which this document is based. The *State CEQA Guidelines* (Section 15151) state:

> *"An EIR should be prepared with a sufficient degree of analysis to provide decision-makers with information which enables them to make a decision which intelligently takes account of environmental consequences. An evaluation of the environmental effects of the proposed project need not be exhaustive, but the sufficiency of an EIR is to be reviewed in light of what is reasonably feasible. Disagreement among experts does not make an EIR inadequate, but the EIR should summarize the main points of disagreement among the experts. The courts have looked not for perfection, but for adequacy, completeness, and a good faith effort at full disclosure."*

1.3 LEAD, RESPONSIBLE AND TRUSTEE AGENCIES

The *State CEQA Guidelines* require the identification of "lead," "responsible," and "trustee" agencies. The County of Monterey is the "lead agency" for the proposed project because it has the principal responsibility for approving the project.

A "responsible agency" is a public agency other than the "lead agency" that has discretionary approval authority over certain components of a project (the *State CEQA Guidelines* define a public agency as a state or local agency, but specifically exclude federal agencies from the definition). A "trustee agency" refers to a state agency having jurisdiction by law over natural resources affected by a project which are held in trust for the people of the State of California (for example, the California Department of Fish and Wildlife).

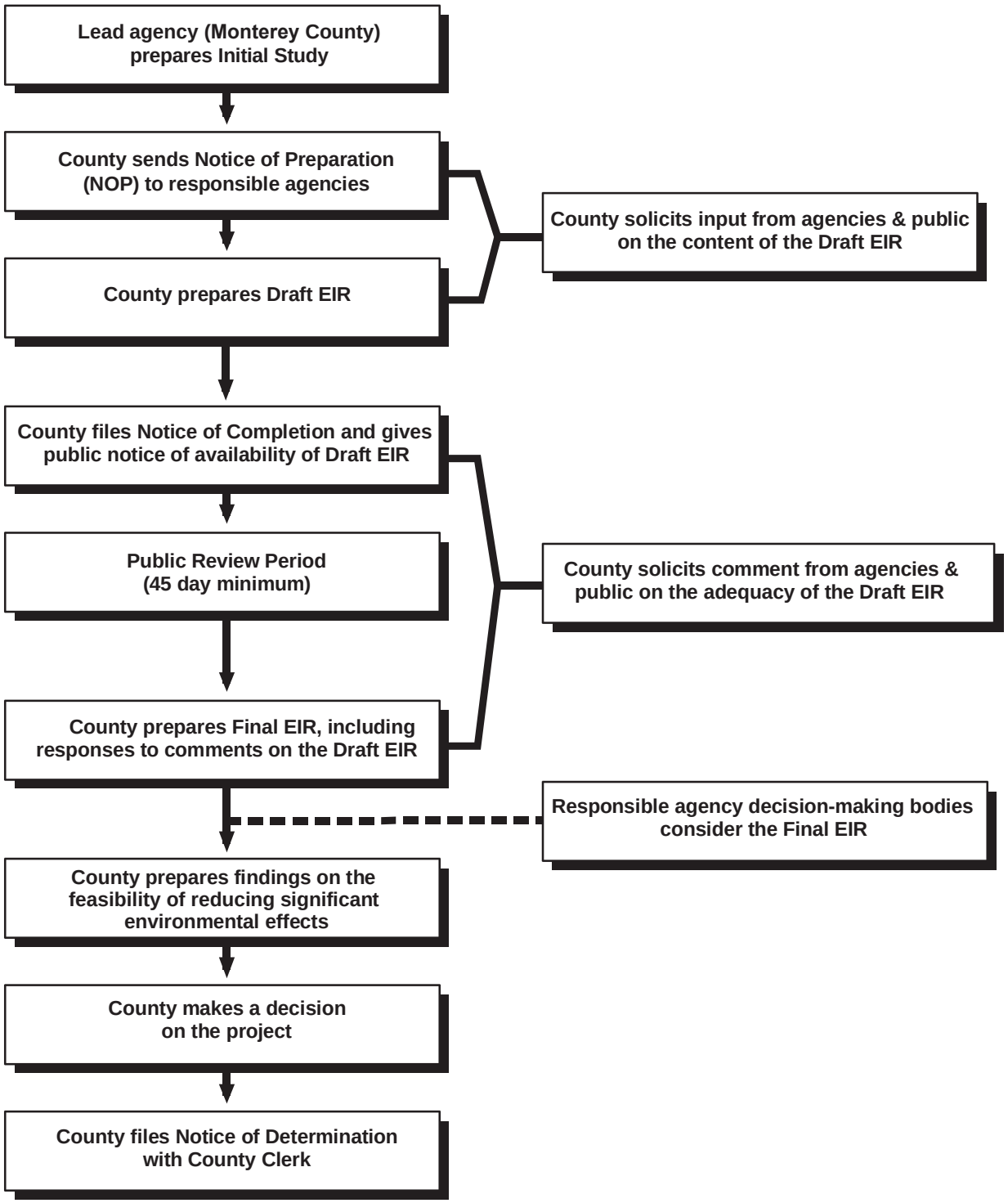
The proposed project will require review and approval from a number of agencies, as described in Section 2.0, *Project Description*.

1.4 ENVIRONMENTAL REVIEW PROCESS

The major steps in the environmental review process, as required under CEQA, are outlined below and illustrated on Figure 1-1. The steps are presented in sequential order.

1. **Notice of Preparation (NOP)/Initial Study.** After deciding that an EIR is required, the lead agency must file an NOP soliciting input on the EIR scope to the State Clearinghouse, other concerned agencies, and parties previously requesting notice in writing (*State CEQA Guidelines* Section 15082; Public Resources Code Section 21092.2). The NOP must be posted in the County Clerk's office for 30 days. Often, the lead agency holds a scoping meeting during the 30-day NOP review period, although this meeting is not required under CEQA.
2. **Draft EIR Prepared.** The Draft EIR must contain: a) table of contents or index; b) summary; c) project description; d) environmental and regulatory setting; e) discussion of significant impacts (i.e., direct, indirect, cumulative, growth-inducing and unavoidable impacts); f) a discussion of alternatives; g) mitigation measures; and h) discussion of irreversible changes.
3. **Notice of Completion.** A lead agency must file a Notice of Completion with the State Clearinghouse when it completes a Draft EIR and prepare a Public Notice of Availability of a Draft EIR. The lead agency must place the Notice in the County Clerk's office for 30 days (Public Resources Code Section 21092) and send a copy of the Notice to anyone requesting it (*State CEQA Guidelines* Section 15087). Additionally, the public Notice of Draft EIR Availability must be given through at least one of the following procedures: a) publication in a newspaper of general circulation; b) posting on and off the project site; and c) direct mailing to owners and occupants of contiguous properties. The lead agency must solicit comments from the public and respond in writing to all written comments received that raise significant environmental issues during the 45-day public comment period (Public Resources Code Sections 21104 and 21253).
4. **Public Review Period**. The minimum public review period for a Draft EIR is 30 days. When a Draft EIR is sent to the State Clearinghouse for review, the public review period

THE EIR PROCESS



CEQA Environmental Review Process

Figure 1-1

Source: Paul Byrne, 2014

must be 45 days unless a shorter period is approved by the Clearinghouse (Public Resources Code Section 21091).

5. **Final EIR.** A Final EIR must include: a) the Draft EIR; b) copies of comments received during public review; c) a list of persons and entities commenting; and d) responses to comments.
6. **Certification of Final EIR.** Prior to making a decision on a proposed project, the lead agency must certify that: a) the Final EIR has been completed in compliance with CEQA; b) the Final EIR was presented to the decision-making body of the lead agency; and c) the decision-making body reviewed and considered the information in the Final EIR prior to approving a project (*State CEQA Guidelines* Section 15090).
7. **County of Monterey Project Decision.** A lead agency may: a) disapprove a project because of its significant environmental effects; b) require changes to a project to reduce or avoid significant environmental effects; or c) approve a project despite its significant environmental effects, if the proper findings and statement of overriding considerations are adopted (*State CEQA Guidelines* Sections 15042 and 15043).
8. **Findings/Statement of Overriding Considerations.** For each significant impact of the project identified in the EIR, the lead or responsible agency must find, based on substantial evidence, that either: a) the project has been changed to avoid or substantially reduce the magnitude of the impact; b) changes to the project are within another agency's jurisdiction and such changes have or should be adopted; or c) specific economic, social, or other considerations make the mitigation measures or project alternatives infeasible *(State CEQA Guidelines* Section 15091). If an agency approves a project with unavoidable significant adverse environmental effects, it must prepare a written Statement of Overriding Considerations that sets forth the specific social, economic, or other reasons supporting the agency's decision.
9. **Mitigation Monitoring/Reporting Program.** When an agency makes findings on significant effects identified in the EIR, it must adopt a reporting or monitoring program for mitigation measures that were adopted or made conditions of project approval to mitigate significant effects.
10. **Notice of Determination.** An agency must file a Notice of Determination after deciding to approve a project for which an EIR is prepared (*State CEQA Guidelines* Section 15094). A local agency must file the Notice with the County Clerk. The Notice must be posted for 30 days and sent to anyone previously requesting notice. Posting of the Notice starts a 30-day statute of limitations on CEQA legal challenges [Public Resources Code Section 21167[c]).

2.0 PROJECT DESCRIPTION

This section provides a description of the proposed project, including information about the project applicant, project location, major project characteristics, approximate construction schedule, project objectives, and discretionary approvals needed for the project.

2.1 PROJECT APPLICANT

Carmel Rio Road LLC
c/o Brian Clark
430 Ortiz, #B
Sand City, CA 93955

2.2 PROJECT LOCATION

The Carmel Rio Road project site is located at 15 and 26500 Val Verde Drive, within the Carmel Valley Master Plan Area, in unincorporated Monterey County, California. The project site lies approximately 0.7 mile southeast of the City of Carmel-by-the-Sea corporate boundary and is outside of the City's formal sphere of influence. The site is approximately 0.3 mile east of State Route (Highway) 1, and approximately 0.2 mile south of Carmel Valley Road. The project site is comprised of three legal parcels: Assessor's Parcel Numbers [APN] 015-021-020-000, 015-021-021-000, & 015-021-015-000.

The project site is bordered to the north and south by low density single-family residences; to the east across Val Verde Drive by undeveloped land; and to the west by existing commercial use buildings and parking lots which are accessed from Carmel Rancho Boulevard. The undeveloped property to the east was previously approved for development of the Carmel Community Life Center; however, entitlements for this project have expired. Beyond the open space across Val Verde Drive is the Rancho Canada Golf Club, located approximately 500 feet east of the southeast corner of the site. The Carmel River is located approximately 1,050 feet south of the site, and Carmel Middle School is located approximately 500 feet east of the northeastern corner of the site. Carmel Valley Road is located approximately 1,050 feet north of the site; however, Val Verde Drive does not connect to Carmel Valley Road.

Figure 2-1 illustrates the location of the proposed project within the region, and Figure 2-2 shows the project within the local context.

2.3 EXISTING SITE CHARACTERISTICS

The current characteristics of the project site are summarized in Table 2-1 and in the discussion that follows. Additional details of the current setting at the site can be found in Section 3.0, *Environmental Setting*, and in the individual issue area discussions in Section 4.0, *Environmental Impact Analysis*.

Imagery provided by ESRI and its licensors © 2015.

Project Location

N

0 0.5 1
Miles

Regional Location

Figure 2-1

Imagery provided by Google and its licensors © 2015.

Project Site

Figure 2-2

Table 2-1
Characteristics of the Project Site and Vicinity

Project Site	
Assessor's Parcel Numbers	015-021-020-000, 015-021-021-000, & 015-021-015-000
Lot Size	Approx. 7.9 acres
Existing Use	Agriculture (row crops), single-family residence
Carmel Valley Master Plan Land Use Designation	Residential – Low Density (LD) 5 -1 Acres/Unit
Zoning Designation	Low Density Residential (max. one unit per acre), Design Control, Site Plan Review, and Residential Allocation Zoning (LDR/1-D-S-RAZ) and subject to Policy CV-1.10
Vicinity	
Surrounding Land Uses	**North:** Rural density single-family residences **South:** Rural density single-family residences **East:** Val Verde Drive and undeveloped land **West:** Commercial use buildings and parking lots
Surrounding Land Use/Zoning Designations	**North:** LD 5 -1 Acres/Unit land use designation and LDR/1-D-S-RAZ zoning designation; subject to Policy CV-1.10 **South:** LD 5 -1 Acres/Unit land use designation and LDR/1-D-S-RAZ zoning designation; subject to Policy CV-1.10 **East:** LD 5 – 1 Acres/Unit land use designation and LDR/1-D-S-RAZ zoning designation; subject to Policy CV-1.10 **West:** Visitor Accommodations/Professional Offices land use designation and VO-D-S-RAZ zoning designation

Source: County of Monterey, Carmel Valley Master Plan, Amended November 5, 1996; and Supplemental Policies Amended February, 2013.

The project site is located on an approximately 7.9-acre property, of which 6.6 acres are currently used for row crop agriculture producing strawberries, melons, artichokes, squash, pumpkins, fennel, fava beans, zucchini, radishes, and flowers. The remaining 1.3 acres, located at the southeast corner of the site, is developed with an existing single-family residence and a detached garage. The southeast corner of the site also contains planted mixed woodland habitat, including Monterey cypress (*Hesperocyparis macrocarpa*), Monterey pine (*Pinus radiata*), myoporum (*Myoporum laetum*), coast redwood (*Sequoia sempervirens*), box elder (*Acer negundo*), and holly-leafed cherry (*Prunus ilicifolia*).

The project site's topography is predominantly flat, and the site lies at an elevation of approximately 34 feet. The Carmel River is located approximately 1,050 feet to the south of the site, and the site is located on a flood-plain terrace on the northern banks of the Carmel River. A

portion of the southwest corner of the site is within the 100-year flood zone, as shown in Figure 4.8-1 in Section 4.8, *Hydrology and Water Quality.* The site elevation is lowest in the southwest corner; however, there is no defined surface sheet-flow over the site.

Regional access to the project site is provided by Highway 1 and Carmel Valley Road. Local access to the site is provided by Rio Road and Carmel Rancho Boulevard to Val Verde Drive, a private road.

Land Use Regulatory Conditions. The existing land use designation of the project site is Residential – Low Density (LD) 5 – 1 Acres/Unit with a zoning designation of Low Density Residential (max. one unit per acre), Design Control, Site Plan Review, and Residential Allocation Zoning (LDR/1-D-S-RAZ). The site is also subject to Carmel Valley Master Plan Policy CV-1.10, which allows up to 4 units per acre if at least 25 percent of the units are reserved for occupants that are county-defined as low and moderate income or for workforce housing. The Design Control (D) Zoning District regulates the location, size, configuration, materials, and colors of structures and fences to assure protection of the public viewshed, neighborhood character, and to assure the visual integrity. The Site Plan Review Zoning District (S) requires review of the location of the development with a required Site Plan Approval Application, as the project is located in an area of the County where development has the potential to adversely affect or be adversely affected by natural resources or site hazards. The Residential Allocation Zoning (RAZ) District limits the number of lots or units which may be created in a given period of time. Projects in the D, S, and RAZ Districts are also subject to Chapter 21.62 - height and setback exceptions.

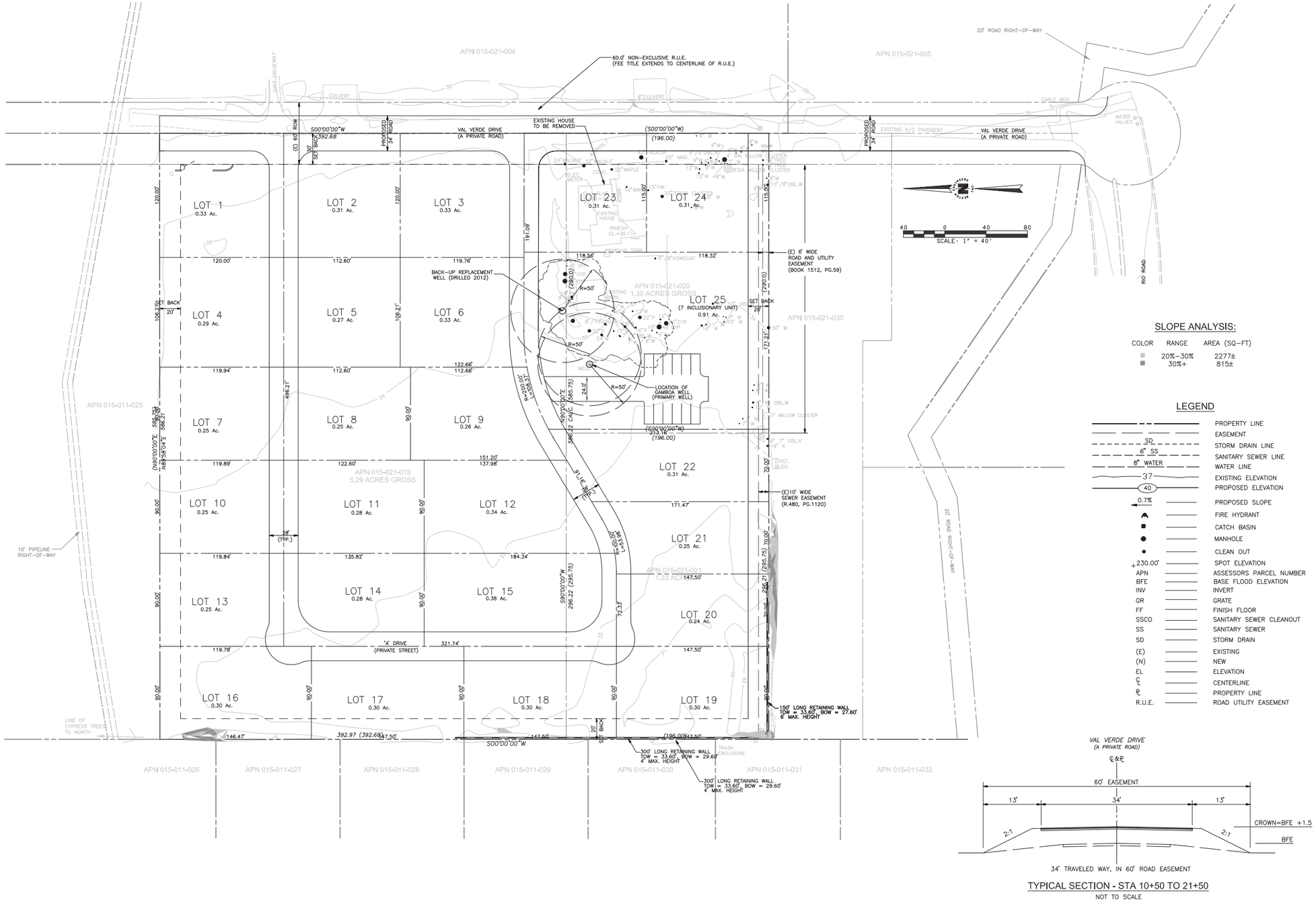
The site is subject to Carmel Valley Master Plan (CVMP) Policy CV-1.10, which designates residential land use densities for the Val Verde Drive area.

> *CVMP Policy CV-1.10: The Val Verde Drive area is planned for residential use at a basic density of one (1) unit per acre. With suitable clustering, up to 2 units per acre may be allowed. However, a density of up to 4 units per acre may be allowed provided that at least 25% of the units are developed for individuals of low and moderate income or for workforce housing. This policy is intended to be independent from Policy CV-1.11, and not counted in conjunction with the density bonus identified in that policy.*

2.4 PROJECT CHARACTERISTICS

The proposed project would subdivide the three existing lots totaling approximately 7.9-acres into 25 lots. Twenty-four of the lots would be developed with one market rate single-family unit on each lot. The remaining lot would be developed with seven inclusionary affordable housing units. A conceptual site plan is shown in Figure 2-3. As shown therein, it is anticipated that market rate lots would range in size from 0.24 to 0.38-acre, and the inclusionary lot would be 0.91 acre. It is anticipated that each market rate home would be approximately 1,670 square feet in size and each of the seven inclusionary units would be approximately 860 square feet in size. Preliminary architectural renderings of the market rate and inclusionary units are shown in Figures 2-4a and 2-4b, respectively.

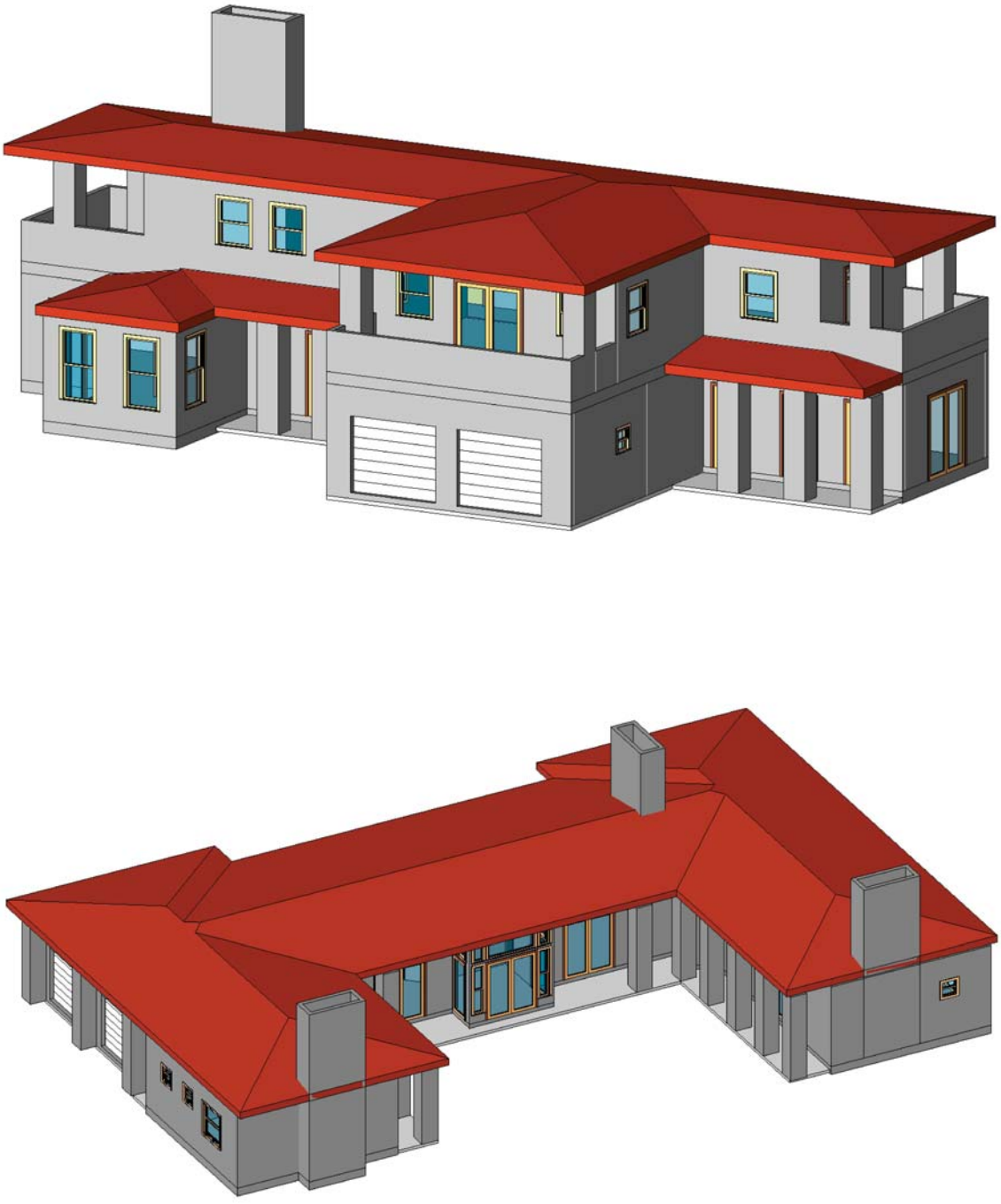
This page intentionally left blank.



Site Plan

Source: Bestor Engineers, 2016

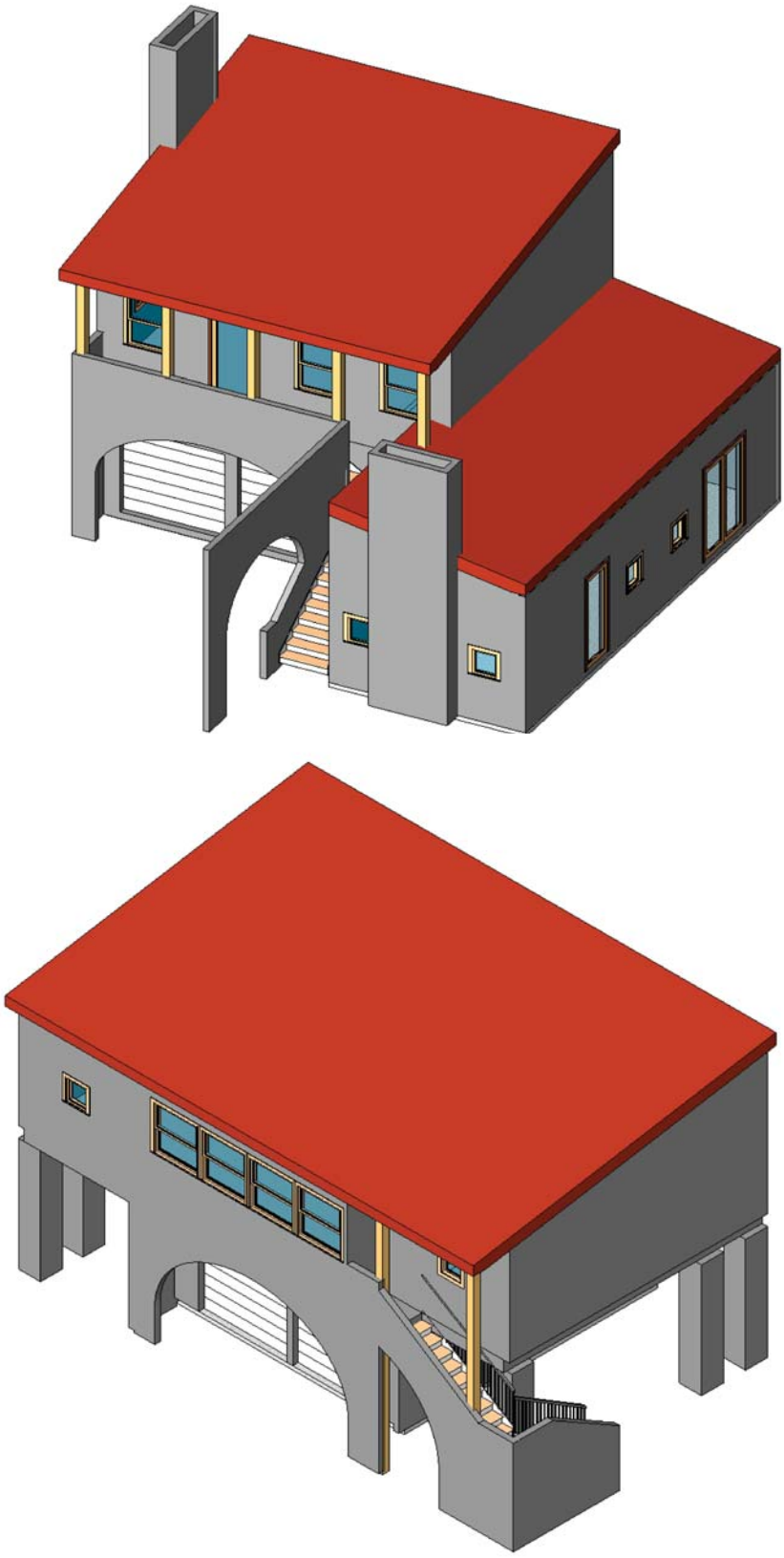
Figure 2-3



Preliminary Architectural Renderings:
Market Rate Single-Family Units

Figure 2-4a

Source: Paul Byrne, 2014



Preliminary Architectural Renderings:
Inclusionary Units

Figure 2-4b

Source: Paul Byrne, 2014

Access would be provided from an improved Val Verde Drive. Currently, Val Verde Drive is a dirt roadway with a width that varies between approximately 16 and 25 feet wide. The applicant would pave this roadway from Rio Road to the northern property boundary, widening it to include two 17-foot travel lanes for a total width of 34 feet. One internal looped road would be constructed on the site, with two entrances to Val Verde Drive, as shown in Figure 2-3.

The project would incorporate native and drought tolerant landscaping. Detailed landscape design would be provided in connection with improvement plans, if the project were approved.

2.4.1 Land Use/ Density

The project site zoning (LDR/1-D-S-RAZ) allows a density of up to one unit per acre. However, as described above, the site is subject to CVMP Policy CV-1.10, which allows a density of up to four units per acre if 25 percent of the units are developed for individuals of low and moderate income or for workforce housing. The project's consistency with this policy is addressed in Section 4.9, *Land Use*.

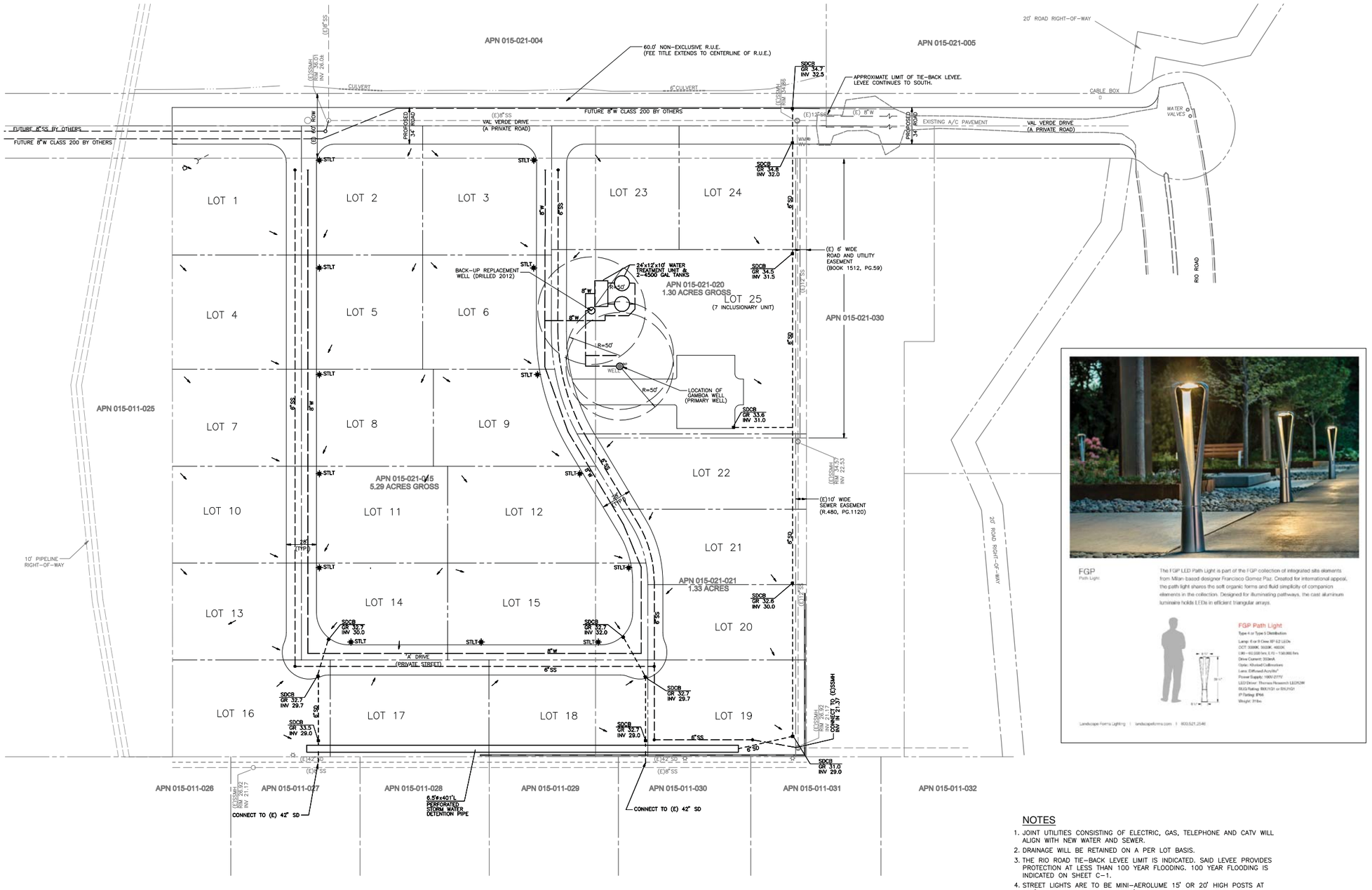
The market rate portion of the project (lots 1 through 24, as shown on Figure 2-3) would be developed at a gross density of 3.42 units per acre (24 units/7 acres). The proposed inclusionary lot (0.9 acres) would be developed with seven units, for a gross density of 7.69 units per acre. The project would require a Zoning Ordinance Amendment that would add clarification to County Code Section 21.14.05A to allow an exception to exceed the four unit/acre lot density limit for the purpose of affordable housing.

2.4.2 Infrastructure

a. Water Supply. A Community Water System (CWS), sourced from the existing New Travers Well and Gamboa Replacement Well, would supply domestic and irrigation water for the project. On-site water infrastructure would include a 24-foot by 12-foot by 10-foot water treatment unit and two 4,500 gallon storage tanks, all located on the proposed inclusionary lot. Treated water would be conveyed to on-site residences through a conventional gravity system of proposed 8-inch water pipes located within proposed street right-of-ways.

b. Sanitary Sewer. Sanitary sewer services would be provided by the Carmel Area Wastewater District (CAWD). Wastewater generated by the proposed project would be collected and conveyed through a conventional gravity system of proposed 6-inch sanitary sewer pipes located within the proposed street right-of-ways, as shown in Figure 2-5. The wastewater collected on-site would be conveyed to an existing 12-inch CAWD sanitary sewer main located at the southwest corner of the property within an existing 10-inch wide sewer easement. This easement abuts the subject property along the entire southern property boundary.

This page intentionally left blank.



NOTES

1. JOINT UTILITIES CONSISTING OF ELECTRIC, GAS, TELEPHONE AND CATV WILL ALIGN WITH NEW WATER AND SEWER.
2. DRAINAGE WILL BE RETAINED ON A PER LOT BASIS.
3. THE RIO ROAD TIE-BACK LEVEE LIMIT IS INDICATED. SAID LEVEE PROVIDES PROTECTION AT LESS THAN 100 YEAR FLOODING. 100 YEAR FLOODING IS INDICATED ON SHEET C-1.
4. STREET LIGHTS ARE TO BE MINI-AEROLUME 15' OR 20' HIGH POSTS AT 100' SPACING AND TYPE II OPTIC'S. SEE CATALOG CUTS FOR DETAIL.
5. THE AVERAGE RAINFALL FOR THIS SITE IS 5.02AF PER YEAR. ASSUMING 50% COLLECTION FACTOR, 2.51AF PER YEAR OF WATER WILL BE RECLAIMED TO CREATE ADDITIONAL WATER FOR THE SITE.

0 25 Feet N

Utility Plan

Source: Bestor Engineers, 2014

Figure 2-5

The project site is currently outside the CAWD service area. However, CAWD is processing a regional annexation of the mouth of the Carmel Valley, including the project site. The application for annexation was approved by the Local Agency Formation Commission (LAFCO) Board on June 27, 2016 and a resolution of acceptance is anticipated for late August 2016 (Drew Lander, CAWD, Personal Communication, July 6, 2016).

c. Stormwater Management. Stormwater would be retained on site through a per-lot design. Overflow on-site drainage would be collected and conveyed in a proposed 6-inch stormwater drain pipe running along the southern terminus of the property and in a proposed 6-inch stormwater drain pipe located along the western property line in a proposed street right-of-way near Lot 16. Both on-site 6-inch stormwater pipes would connect to an on-site 6.5-foot wide by 401-foot long perforated stormwater detention pipe, located at the western end of the site, that would allow for groundwater recharge. Overflow from the perforated stormwater detention pipe would be directed to an existing 42-inch stormwater pipe (or storm drain line), which has outlets near both the north and south ends of the perforated stormwater detention pipe. On-site runoff would be detained or filtered by berms, vegetated filter strips, or catch basins to prevent sediment from leaving the site.

d. Electricity and Natural Gas. Electricity and natural gas to the site would be provided by the Pacific Gas and Electric Company.

2.4.3 Grading and Construction

For the purposes of this analysis, it is assumed that vegetation over the entire project site would be removed as part of the site preparation process. This would include the removal of existing agricultural row crops and planted mixed woodland habitat, including on-site trees which include Monterey cypress, Monterey pine, coast redwood, and box elder. The existing on-site residence in the southeast corner of the site would be demolished.

According to the proposed grading plan, shown in Figure 2-6, the proposed project would require 199 cubic yards of cut and 11,359 cubic yards of fill. The approximately 11,160 cubic yards of imported fill dirt would elevate the southwest corner of the site (including all or part of Lots 18, 19, 20, and 21) between two to three feet above the 100-year floodplain.

Project construction would begin three to six months after project approval. The project may be constructed in a single phase subject to market conditions. For the purpose of this EIR, it is assumed that construction would be completed within approximately 18 months.

This page intentionally left blank.

CUT/ FILL ANALYSIS

COLOR	RANGE BEGIN	RANGE END	PERCENT	AREA
	−2.00	−1.00	0.1	452.00
	−1.00	0.00	8.6	28767.00
	0.00	1.00	60.3	201774.50
	1.00	2.00	28.0	93734.00
	2.00	3.00	2.0	6603.50
	3.00	4.00	0.5	1695.00
	4.00	5.00	0.5	1585.00

EARTHWORK

GROSS CUT	199 CUBIC YARDS
GROSS FILL*	11359 CUBIC YARDS
GROSS EXCESS FILL	11160 CUBIC YARDS

*ASSUMED FILL FACTOR = 10%

LEGEND

	EXISTING	PROPOSED
PROPERTY LINE		
EDGE OF PAVEMENT		
EASEMENT		
GRADE BREAK		
FENCE		
RETAINING WALL		
MANHOLE		
CATCH BASIN		
POWER POLE		
ELECTROLIER		
CONTOURS	33	35
SPOT ELEVATION	+ 14.8	x45.0
SLOPE DIRECTION	2%	0.5%
R.U.E.	ROAD UTILITLY EASEMENT	
BOW	BOTTOM OF WALL	
TOW	TOP OF WALL	

N

0 40 80 Feet

Grading and Soil Erosion Control Plan

Source: Bestor Engineers, 2014

Figure 2-6

2.5 PROJECT OBJECTIVES

The applicant's objectives of the proposed Carmel Rio Road project are summarized as follows:

- Create a mix of market rate and affordable housing.
- Create an economically integrated infill project integrated with pedestrian and bike paths and walkways.
- Accommodate diverse modes of transportation
- Integrate energy-efficient home designs, optional solar power generation, and water conservation.
- Achieve objectives of the CVMP by implementing high-density housing.
- Position project as an infill development which can minimize extension of infrastructure and reduce travel in the Carmel Valley by providing housing adjacent to commercial uses.
- Provide a balance of housing supporting local needs with a mix of 25% inclusionary housing and the balance of market rate.

2.6 REQUIRED APPROVALS

The proposed project will require review and approval from a number of agencies. Provided below is a list of the anticipated discretionary permits requiring approval by the County of Monterey.

- *Certification of Final EIR*
- *Approval of a Combined Development Permit consisting of:*
  - *A standard subdivision of three existing lots totaling approximately 7.9 acres into 24 market rate lots and one inclusionary housing lot with seven units;*
  - *Use Permit pursuant to Section 21.12.050.A to allow seven units on Lot 25; and*
  - *Administrative Permit and Design Approval for development in the S and D Zoning District.*
- *Approval of a Zoning Ordinance Amendment to add clarification to Section 21.14.050 that allows an exception to exceed a 4 unit/acre lot density for the purpose of affordable housing pursuant to Policy CV 1.10 in the Carmel Valley Master Plan.*

The following includes a list of other government agencies that would or may have some level of approval for one or more components of the proposed project, as required by State CEQA Guidelines Section 15124(d):

- Monterey Peninsula Water Management District – Water Distribution Permit to amend the current water system to serve the subdivision (MPWMD Rule 20-A)
- Carmel Area Wastewater District – Annexation of site into service area
- Local Agency Formation Commission – Approval of Annexation

This page intentionally left blank.

3.0 ENVIRONMENTAL SETTING

This section provides a general overview of the environmental setting for the project. More detailed descriptions of the environmental setting for each environmental issue area can be found in Section 4.0, *Environmental Impact Analysis*.

3.1 REGIONAL SETTING

The Carmel Rio Road project site is located in northwestern Monterey County, in the westernmost portion of the Carmel Valley planning area known as the Mouth of the Valley. Figures 2-1 and 2-2 in Section 2.0, *Project Description*, illustrate the regional location of the Carmel Rio Road project area. Regional access to the project site is provided by Highway 1 and Carmel Valley Road. Local access to the site is provided by Rio Road and Carmel Rancho Boulevard to Val Verde Drive, a private road.

The Carmel Valley is bounded by the Santa Lucia Mountains to the southwest and the Sierra de Salinas Mountains to the northeast. These two mountain ranges are located within the Pacific Coast Ranges of California, which are characterized by a series of northwest trending mountains and valleys. The Carmel Valley consists of a relatively flat valley floor drained by the Carmel River. Land on both sides of the valley includes open space and preserved areas, such as the Santa Lucia Preserve, Palo Corona Ranch Regional Park, Thomas Open Space, Garland Ranch Regional Park, Jacks Peak County Park, and Hatton Canyon State Park. As these areas remain largely undeveloped, they tend to support a rich mosaic of oak forests, chaparral scrublands, grasslands, and riparian habitats, and are generally characterized by rolling hills and broad northwest-southeast trending valley.

The project site is located in the Carmel River Hydrologic Unit, a 255 square mile, southeast-northwest trending watershed in the coast ranges of central Monterey County. The Carmel River Watershed drains the Carmel Valley northwestward and feeds into the Carmel River, which meanders for 36 miles in a northwesterly direction merging with seven major stream tributaries until it flows into the Pacific Ocean at Carmel Bay (MPWMD 2014). The terminus of the Carmel River with the Pacific Ocean is approximately 0.7 mile northwest of the project site, just south of the City of Carmel-by-the-Sea.

The developed landscapes of the Valley are comprised of rural residential and single family development, various commercial uses that support the Valley's residents and visitors, and small-scale seasonal agricultural. Recreational land uses, including several golf and tennis facilities, occur throughout the valley at a variety of locations.

3.2 PROJECT SITE SETTING

The project site consists of approximately 7.9 acres and is located in unincorporated Monterey County, California, approximately 0.7 mile southeast of the City of Carmel-by-the-Sea. The site is located approximately 0.3 mile east of Highway 1, approximately 0.2 mile south of Carmel Valley Road, and approximately 1,050 feet north of the Carmel River. The project site is comprised of three legal parcels: Assessor's Parcel Numbers [APN] 015-021-020-000, 015-021-021-000, & 015-021-015-000.

Approximately 6.6 acres, or 83.5% of the site, are currently used for row crop agriculture producing strawberries, melons, artichokes, squash, pumpkins, fennel, fava beans, zucchini, radishes, and flowers. The remaining 1.3 acres, located at the southeast corner of the site, is developed with an existing single-family residence and a detached garage. The southeast corner of the site also contains planted mixed woodland habitat, including Monterey cypress (*Hesperocyparis macrocarpa*), Monterey pine (*Pinus radiata*), myoporum (*Myoporum laetum*), coast redwood (*Sequoia sempervirens*), box elder (*Acer negundo*), and holly-leafed cherry (*Prunus ilicifolia*). Other vegetation communities on the project site include agricultural field and developed. These communities are described in Section 4.3*, Biological Resources.*

The project site's topography is predominantly flat, and the site lies at an elevation of approximately 34 feet. The Carmel River is located approximately 1,050 feet to the south of the site, and the site is located on a flood-plain terrace on the northern banks of the Carmel River. A portion of the southwest corner of the site is within the 100-year flood zone, as shown in Figure 4.8-1 in Section 4.8, *Hydrology and Water Quality*. The site elevation is lowest in the southwest corner; however, there is no defined surface sheet-flow over the site.

The project site is bordered to the north and south by low density single-family residences; to the east across Val Verde Drive by undeveloped land; and to the west by existing commercial use buildings and parking lots which are accessed from Carmel Rancho Boulevard. The undeveloped property to the east was previously approved for development of the Carmel Community Life Center; however, entitlements for this project have expired. Beyond the open space across Val Verde Drive is the Rancho Canada Golf Club, located approximately 500 feet east of the southeast corner of the site. The Carmel River is located approximately 1,050 feet south of the site, and Carmel Middle School is located approximately 500 feet east of the northeastern corner of the site. Carmel Valley Road is located approximately 1,050 feet north of the site; however, Val Verde Drive does not connect to Carmel Valley Road.

3.3 CUMULATIVE PROJECTS SETTING

The *State CEQA Guidelines* require the analysis of the cumulative effects of a project in combination with other past, present and reasonably foreseeable future development in the area. CEQA defines "cumulative impacts" as two or more individual events that, when considered together, are considerable or will compound other environmental impacts. Cumulative impacts are the changes in the environment that result from the incremental impact of development of the proposed project and other nearby projects. For example, traffic impacts of two nearby projects may be insignificant when analyzed separately, but could have a significant impact when analyzed together. Section 15130 of the *State CEQA Guidelines* prescribes two methods for analyzing cumulative impacts: (1) use of a list of past, present, and reasonably foreseeable future projects producing related or cumulative impacts; or (2) use of a summary of projections contained in an adopted general plan or related planning document. This EIR uses the list approach to provide a tangible understanding and context for analysing the potential cumulative effects of a project. General plans and other planning documents were used as additional reference points in establishing the cumulative scenario for the analysis.

Past, present and reasonably foreseeable future projects that could produce related or cumulative impacts are listed in Table 3-1, and include projects in Carmel Valley. The table

indicates the project name and project type, as well as its location and status. Collectively, these projects represent known and anticipated activities that may occur in the project vicinity that have the potential to produce related or cumulative impacts on the environment.

Table 3-1
Cumulative Project List

Project Name	Project Type	Location	Status
Approved Projects			
Bay Laurel LLC (PLN020398)	16 additional hotel units at the existing 57-unit Bernardus Lodge.	415 Carmel Valley Road, Carmel Valley; 3.9 miles east of the project site.	Approved but not yet constructed
September Ranch Subdivision (PLN050001 and PLN110173)	95 residential lots including 15 inclusionary and 7 deed-restricted workforce housing lots; 50 stable equestrian center	Approximately 2.5 miles east of Highway 1 on the north side of Carmel Valley Road, between Canada Way and Valley Greens Drive; 2.1 miles east of the project site.	Approved but not yet constructed
Heritage Development (PLN060603)	Subdivision of three lots into four lots	27050, 27070, and 27080 Rancho San Carlos Road, Carmel Valley; 1.8 miles southeast of the project site.	Approved but not yet constructed
Pending Projects			
Mary Delfino Trust (PLN060276)	18 single family lots and six multi-family units.	Former Carmel Valley Airport site (APNs 187-521-014-000, 187-521-015-000, 187-512-016-000, 187-512-017-000, 187-512-018-000, and 187-502-001-000); 10.1 miles southeast of the project site.	Deemed complete on December 10, 2009. Not yet approved.
Rancho Canada Village (PLN040061)	281 mixed use residential units consisting of: 182 single family, 64 townhomes, and 35 condominiums/flats	4860 Carmel Valley Road, Carmel Valley; 480 feet east of the project site.	Recirculated Draft EIR comment period closes August 8, 2016.
Carmel Valley Affordable Housing (PLN160428)	120 affordable units	East side of Val Verde Drive, south of Carmel Valley Road; 400 feet north of the project site.	Pre-application submitted to County on June 29, 2016.
Carmel Properties LLC/Foothill Partners (PLN150668)	30,000 square foot grocery store/convenience market and three separate multi-tenant buildings ranching from 5,000 sf to 5,525, for a total of 46,000 square feet of retail development	3705 Rio Road, Carmel; 1,100 feet west of the project site.	Application submitted June 10, 2016.

Source: Hatch Mott MacDonald, 2016; Bob Schubert, Monterey County RMA – Planning Department, Personal Communication, July 2016.

The area within which a cumulative effect can occur varies by resource. For example, air quality impacts tend to disperse over a large area, while soils hazards impacts are typically more localized. For this reason, the geographic scope for the analysis of cumulative impacts must be identified for each resource area.

The analysis of cumulative effects considers a number of variables including spatial limits, time limits, and the characteristics of the resource being evaluated. The geographic scope of each analysis is based on the topography surrounding the proposed project and the natural boundaries of the resource affected, rather than jurisdictional boundaries. The geographic scope of cumulative effects will often extend beyond the scope of the direct effects, but not beyond the scope of the direct and indirect effects of the project. The geographic extent and cumulative impact analysis for each individual issue area is included in the respective discussions in Sections 4.1 through 4.15 of this EIR.

4.0 ENVIRONMENTAL IMPACT ANALYSIS

This section discusses the possible environmental effects of the proposed project for the specific issue areas that were identified as having the potential to experience significant impacts.

"Significant effect" is defined by the *State CEQA Guidelines* §15382 as:

> *"a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance. An economic or social change by itself shall not be considered a significant effect on the environment, but may be considered in determining whether the physical change is significant."*

The assessment of each issue area begins with the setting and is followed by the impact analysis. Within the impact analysis, the first subsection identifies the methodologies used and the "significance thresholds," which are those criteria adopted by the lead agency Monterey County or by other agencies with jurisdiction over resources. Other thresholds are universally recognized or have been developed specifically for this analysis. The next subsection describes each impact of the proposed project, mitigation measures for significant impacts, and the level of significance after mitigation. Each effect under consideration for an issue area is separately listed in bold text, with the discussion of the effect and its significance following. Each bolded impact listing also contains a statement of the significance determination for the environmental impact as follows:

> ***Significant and Unavoidable:*** *An impact that cannot be reduced to below the significance threshold level with implementation of reasonably available and feasible mitigation measures. Such an impact requires a Statement of Overriding Considerations to be issued if the project is approved per §15093 of the State CEQA Guidelines.*
>
> ***Significant but Mitigable:*** *An impact that can be reduced to below the significance threshold level with implementation of reasonably available and feasible mitigation measures. Such an impact requires findings to be made under §15091 of the State CEQA Guidelines.*
>
> ***Less than Significant:*** *An impact that may be adverse, but does not exceed the significance threshold levels and does not require mitigation measures. However, mitigation measures that could further lessen the environmental effect may be suggested if readily available and easily achievable.*
>
> ***No Impact:*** *No impact would occur.*
>
> ***Beneficial Impact:*** *The project would result in a beneficial impact on the environment.*

Following each environmental effect discussion is a listing of mitigation measures (if required) and the residual effects or level of significance remaining after the implementation of the measures. In those cases where the mitigation measure for an impact could have a significant environmental impact in another issue area, this impact is discussed as a residual effect. The impact analysis concludes with a discussion of cumulative effects, which evaluates the impacts associated with the proposed project in conjunction with other future development in the area.

This page intentionally left blank.

4.1 AESTHETICS

4.1.1 Summary

Table 4.1-1 summarizes the identified environmental impacts, proposed mitigation measures, and residual impacts of the proposed project with regard to aesthetics. Additional detail is provided in Section 4.1.3 (Impact Analysis).

Table 4.1-1
Impact and Mitigation Summary: Aesthetics

Impact	Mitigation Measures	Residual Impact
Impact AES-1 Carmel Valley Road, designated as a prime viewing corridor by the County of Monterey, provides a brief viewing corridor of the project site. However, views accessed by Road travelers would be brief and no scenic vista would be blocked or significantly altered. Impacts would be Class II, *less than significant*.	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact AES-2 The proposed project would convert the existing rural character of the site to a more urban character. However, the project location makes it a natural extension of the existing urban landscape of lower Carmel Valley. By adhering to the CVMP policy CV-1.1, the development would maintain the rural character of the region and thus would not degrade the existing visual character or quality of the site. Impacts would be Class III, less than significant.	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact AES-3 The proposed project would introduce new sources of light to the project area. Impacts would be Class II, significant but mitigable.	**Downcast Lighting**. All street lighting and exterior lighting on residences shall be downcast with full cutoff fixtures and low mounted to reduce light trespass onto adjacent properties. The proposed lighting plan shall be submitted to and approved by the Monterey County RMA – Planning Department prior to issuance of grading permits.	Implementation of Mitigation Measure AES-3 would reduce nighttime lighting-related impacts to a less than significant level.

4.1.2 Setting

a. Regional Landscape. The proposed project would be located within the Carmel Valley Master Plan Area. The Carmel Valley consists of a relatively flat valley floor bounded to the north and south by the Coast Range Mountains, and drained by the Carmel River. Land on both sides of the valley includes open space and preserved areas, such as the Santa Lucia Preserve, Palo Corona Ranch Regional Park, Thomas Open Space, Garland Ranch Regional Park, Jacks Peak County Park, and Hatton Canyon State Park. As these areas remain largely

undeveloped, they tend to support a rich mosaic of oak forests, chaparral scrublands, grasslands, and riparian habitats, and are generally characterized by rolling hills and broad northwest-southeast trending valley.

Overall, the developed landscapes of the Valley are comprised of rural residential and single family development, various commercial uses that support the Valley's residents and visitors are dispersed along the main roadway, and small-scale seasonal agricultural is seen throughout the Valley. Carmel Valley has traditionally been divided into three areas: the Lower Valley area, near Highway 1; Mid-Valley area, in the vicinity of Robinson Canyon Road; and Upper Valley area, in the vicinity of Carmel Valley Village. Higher residential densities have tended to occur in the Upper Valley, while lower density developments have occurred elsewhere, frequently near golf courses and commercial centers in the Lower- and Mid-Valley areas. Recreational land uses, including several golf and tennis facilities, occur throughout the valley at a variety of locations. The project site is located in the Lower Valley area.

Several scenic routes link the Carmel Valley with other areas of the County. Carmel Valley Road, a designated prime viewing corridor and the principal arterial through the Valley, extends from SR 1 through the highlands of the upper Valley, where it changes names to Arroyo Seco Road before connecting to the Salinas Valley in the east. Laureles Grade Road, another proposed County scenic route, connects Carmel Valley Road with State Route (SR) 68, which ultimately extends east to Highway 101 in Salinas and west to Highway 1 in Monterey. Highway 1, which traverses the lower end of Carmel Valley, provides a major coastal thoroughfare from Big Sur to Monterey. Portions of this route have been designated as a State Scenic Highway, including the portion in Monterey County that extends from the Carmel River north to SR 68.

b. Project Site Setting. The project site is located on a 7.9-acre property, of which 6.6 acres are currently used for row crop agriculture, crops of which vary with the seasons and include fruit, vegetables, and flowers. The remaining 1.3 acres, located at the southeast corner of the site, is developed with an existing single-family residence and farm accessory buildings (refer to Figure 2-2 in Section 2.0, *Project Description*). The southeast corner of the site also contains planted mixed woodland habitat, including Monterey cypress, Monterey pine, myoporum, coast redwood , box elder, and holly-leafed cherry. The remainder of the site is clear of trees or other mature landscaping, aside from seasonal agriculture.

The project site's topography is essentially flat, and the site lies at an elevation of approximately 34 feet. The Carmel River is located approximately 1,050 feet to the south of the site, and the site is located on a flood-plain terrace on the northern banks of the Carmel River.

The project site is surrounded by a mix of single family residential and commercial land use. Directly to the north and south are single family homes with some equestrian use. The low density of these residences imparts a rural setting. Further to the north, more commercial and denser residential development can be viewed within the Carmel Rancho Shopping Center and the Cottages of Carmel retirement community. On the south side of Rio Road, to the south of the project site, higher density housing has been developed with two story townhomes. Directly to the west of the project are commercial use buildings along the east side of Carmel Rancho Boulevard, developed to a more intensive suburban scale. Further west is more commercial

development, including the Barnyard Shopping Village. To the east of the project, across Val Verde Drive, is an undeveloped parcel of land that was previously entitled for a Community Center. Past the undeveloped land, there is the Carmel Valley Middle School and the Rancho Canada Golf Club.

Currently, night time light generated from the project site is limited to light generated from the existing single family residence on the site. However, ambient light is produced from surrounding development, including residential development to the north and south, commercial development to the west along Carmel Rancho Boulevard, and streetlights along Rio Road and Carmel Rancho Boulevard.

c. Proposed Project Viewshed. The project site is approximately 1,200 feet to the south of Carmel Valley Road, which is designated as a prime viewing corridor. The project site is obscured from eastbound vehicular traffic by foreground elements such as Carmel Rancho Shopping Center, the Cottages of Carmel, and associated landscaping. The project site is largely obscured from westbound traffic by the Carmel Valley Middle School and the row of mature cypress trees planted along the school's western property line. However, there is a window of approximately 35 degrees where westbound travelers on Carmel Valley Road have direct views of the project site. Viewers from this location, looking south toward the site, generally have a middle-ground view of the site and a background view of the Santa Lucia Mountains.

Directly to the west of the project site are commercial use buildings along the east side of Carmel Rancho Boulevard. Views of the site from Carmel Rancho Boulevard are generally obstructed by the existing commercial development and landscaping. Land directly east of the project consists of undeveloped land, Carmel Valley Middle School, and the Rancho Canada Golf Club. Views of the proposed project from the Carmel Valley Middle School are obstructed by mature cypress trees planted along the school's western property line. The proposed project is not visible from Rancho Canada Golf Club fairways.

d. Existing Visual Character. The existing site is currently composed of approximately 6.6 acres of seasonal row crop agriculture. The remaining 1.3 acres – located in the southeast corner of the property – is developed with a single family residence and farm accessory buildings. Surrounding the existing structures in the southeast corner of the property is a planted mixed woodland habitat. Overall, the existing site can be characterized as a rural setting.

Figures 4.1-1 and 4.1-2 show photographs of the existing character and surroundings of the project site. Photo 1 on Figure 4.1-1 shows a view through the project site from western site border to the northeast. The existing agricultural uses of the site are seen in the foreground with an existing rural single family residence and the Cottages of Carmel development to the north of the project site in the middle-ground and the Coastal Ranges along the north side of the Carmel Valley in the background. Photo 2 shows the view looking southeast from the western site border. In this photo, the existing annual agricultural uses of the site are seen in the foreground with the existing on-site single family residence and the Santa Lucia Mountains in the background. Photo 3 in Figure 4.1-2 shows the view looking west through the site from the southeast corner, near the existing on-site residence. The existing annual agricultural uses of the site are seen in the foreground and existing commercial development along Carmel Rancho

Photo 1: View looking northeast through the project site. The foreground shows the existing annual row crop agricultural land use on the site. Middleground shows the existing single family residence north of the project site, and the background shows the Coastal Range along the north side of the Carmel Valley.

Photo 2: View looking southeast through the project site. The foreground shows the existing annual row crop agricultural land use on the site. Middleground shows the existing single family residence on the project site, and the background shows the Santa Lucia Mountains along the south side of the Carmel Valley.

Site Photographs Figure 4.1-1

Photo 3: View looking west through the project site from the southeast corner of the project site. The foreground shows the existing annual row crop agricultural land use on the site. The background shows the existing commercial development along Carmel Rancho Boulevard.

Photo 4: View looking northwest through the project site. The foreground shows the existing annual row crop agricultural land use on the site. The middleground shows the existing single family residence north of the project site and commercial uses along Carmel Rio Road. The background shows the Coastal Range along the northwest portion of the Carmel Valley.

Site Photographs Figure 4.1-2

Boulevard can be seen in the background. Photo 4 shows the view looking northwest from the southeast corner of the site. This photo shows the existing annual agricultural uses of the site in the foreground and the existing commercial development along Carmel Rancho Boulevard and the existing single family residence to the north of the project site in the background.

The properties directly to the north and south of the project site are consistent with the rural setting. The properties directly to the north consist of two roughly 2.6 acre lots, each with a single residence and the remaining property dedicated to equestrian uses or open space. To the south, properties are similarly dedicated to single family residences coupled with equestrian uses and woodland habitat. The property to the east of the project site, while previously entitled to a community center, remains undeveloped. This undeveloped land adds to the rural character of the surrounding area.

To the west of the proposed project, the rural character of the land transitions to a more urban character. Starting directly west of the project site, on Carmel Rancho Boulevard, land use turns to single and two story commercial buildings and shopping centers. Further to the north and south of the project, the rural character again transitions to urban. South of the project area, on the south side of Rio Road, is a development of two story townhomes. Similarly, to the north, off of Carmel Valley Road, the Carmel Rancho Shopping Center and the Cottages of Carmel retirement community impart a developed precinct.

e. Regulatory Setting.

State.

California State Scenic Highway Program. The California State Scenic Highway program was created by the Legislature in 1963. Its purpose is to preserve and protect scenic highway corridors from change that would diminish the aesthetic value of lands adjacent to highways. The program includes a list of highways that are either designated or eligible for designation as a scenic highway. The state laws governing the Scenic Highway Program are found in the Streets and Highways Code, Sections 260 through 263. A highway may be designated scenic depending upon how much of the natural landscape can be seen by travelers, the scenic quality of the landscape, and the extent to which development intrudes upon the traveler's enjoyment of the view.

Highway 1 is approximately 0.3 mile west of the project site and is designated as a State Scenic Highway in this location. However, the project site is not visible from Highway 1. There are no other State Scenic Highways in the vicinity of the site.

Local.

Monterey County Code. The County of Monterey requires an evaluation of potential aesthetic-related effects and a determination of significance from common public view areas. "Common public viewing area means a public area such as a public street, road, designated vista point, or public park from which the general public ordinarily views the surrounding viewshed" (Monterey County Code, §21.06.195). For the purposes of visual impact analyses, Monterey County defines a substantial adverse visual impact as a "visual impact which, considering the condition of the existing viewshed, the proximity and duration of view when

observed with normal unaided vision, causes an existing visual experience to be materially degraded" (Monterey County Code, §21.06.1275).

The project site is subject to the County' Design Control District and Site Plan Review District requirements. Design Control Districts require the submittal and approval of a Design Approval Application prior to issuance of a building permit for any structures. The Design Approval Application must include proposed design elevations, color samples for proposed development, and plot plans or drawings.

Site Plan Review Zoning Districts require the submittal and approval of a Site Plan Approval Application. The Site Plan Approval Application must also include plot plans or drawings.

Title 21 (Zoning) of the Monterey County Code does not include lighting requirements for these areas.

Monterey County General Plan. The Open Space Element of the Monterey County General Plan contains guidance, goals, and specific policies relating to maintaining and improving the appearance of the physical environment. Goal OS-1 calls for retaining the character and natural beauty of Monterey County "by preserving, conserving, and maintaining unique physical features, natural resources, and agricultural operations." Policies further encourage voluntary restrictions on the development of properties located in designated visually sensitive areas (Policy OS-1.1), and restrict development on ridgelines (Policy OS-1.3). General Plan policies further restrict the significant disruption of views from designated scenic routes (Policy OS-1.12).

Carmel Valley Master Plan. Within the Monterey County General Plan, the Carmel Valley Master Plan (CVMP) contains the guidance, goals and specific policies for the development of the Carmel Valley. Policy CV-1.1 states that "All policies, ordinances, and decisions regarding Carmel Valley shall be consistent with the goal of preserving Carmel Valley's rural character. In order to preserve the rural character of Carmel Valley, development shall follow a rural architectural theme with design review." Policy CV-1.6 builds on CV-1.1 to set a cap on the total number of new residential units that can be developed in the valley at 190 units.

4.1.3 Impact Analysis

a. Methodology and Significance Thresholds.

Methodology. The assessment of impacts to scenic vistas, scenic resources, and visual character involves qualitative analysis that is inherently subjective in nature. Different viewers react to viewsheds and aesthetic conditions differently. Visual or aesthetic resources generally are defined as both the natural and built features of the landscape that contribute to the public's experience and appreciation of the environment. Depending on the extent to which a project's presence would alter the perceived visual character and quality of the environment, a visual or aesthetic impact may occur. This evaluation measures the existing visual resource against the proposed project. The current environmental setting for the project site and surrounding area was established using the review of site photographs and aerial satellite imagery. The County of Monterey General Plan and Carmel Valley Master Plan were reviewed for policy instruction relative to visual resources and design policy.

Views may be characterized in terms of foreground, middleground, and background views. Foreground views are those immediately presented to the viewer, and include objects at close range. Middleground views occupy the center of the viewshed, and tend to include objects that dominate the viewshed in normal circumstances. Background views include distant objects and other objects that make up the horizon.

Only public views or view corridors are evaluated; views from private property such as backyards, front yards, interior living spaces, or private roadways are not considered public view corridors. Furthermore, CEQA distinguishes between public and private views, and focuses on whether a project would affect the public environment rather than of particular individuals. Private views, such as from individual homes, generally are not analyzed under CEQA. Potential impacts on such individual views would not be environmentally significant. Accordingly, views from private residences are not discussed in this impact analysis.

Visual renderings provided by the project architect were used to provide a visual representation of the proposed project from varying viewpoints to illustrate the extent of visual change to the existing character of the site and the associated impact to surrounding viewers. This portion of the analysis was based in part on a *Visual Impact Study* prepared for the proposed project by Paul Byrne, Architect LEED AP (2014). This report is included as Attachment B to this EIR.

Significance Thresholds. The following thresholds for measuring a project's environmental impacts are based on CEQA Guidelines and standards used by the County of Monterey. For the purposes of this EIR, impacts are considered significant if the project would:

1. Have a substantial adverse effect on a scenic vista;
2. Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway;
3. Substantially degrade the existing visual character or quality of the site and its surroundings; and/or
4. Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area.

The project site is not visible from a state scenic highway, and therefore would result in no impacts to scenic resources within a state scenic highway. As a result, threshold 2 is not discussed in this section. For a more detailed discussion of State scenic highways, refer to Section 4.16, *Effects Found Not to be Significant*.

b. Project Impacts and Mitigation Measures

Threshold 1:	*Have a substantial adverse effect on a scenic vista.*

Impact AES-1 **Carmel Valley Road, designated as a prime viewing corridor by the County of Monterey, provides a brief viewing corridor of the project site. However, views accessed by Road travelers would be brief and no scenic vista would be blocked or significantly altered. Impacts would be Class II, *less than significant*.**

The CVMP specifically protects vistas from key public viewing areas such as Carmel Valley Road. Policy CV-3.3 prohibits development that significantly blocks views of the viewshed, the Carmel River, or the distant hill as seen from Carmel Valley Road (County of Monterey, 2013). As demonstrated in the Visual Impact Study (Appendix B), views of the project site from Carmel Valley Road are limited. An existing line of cypress trees along the western edge of Carmel Valley Middle School block views of the site from westbound traffic. There is an approximately 300 foot viewing corridor of the site to westbound traffic between the cypress trees other foreground trees and the Cottages of Carmel development (Byrne, 2014). Views of the project site would be blocked to eastbound traffic by foreground trees and the Cottages of Carmel development. Within the 300-foot viewing corridor, Carmel Valley Road is at an elevation of approximately 56 feet above sea level and the project site is at an elevation of approximately 34 feet. Further, the project site is approximately 0.2 mile south of Carmel Valley Road. Given this distance and because the site is at a lower elevation, the proposed residences would not hinder vistas of the Carmel River or the distant hills within the 300 foot viewing corridor.

Furthermore, formal design review would be required for the project, which would ensure that the proposed project acts as a visual extension of the surrounding developments such as the Cottages of Carmel and the commercial buildings along Carmel Rancho Boulevard. Thus, the proposed project would have a less than significant impact on scenic vistas.

Mitigation Measures. No mitigation is required.

Significance After Mitigation. Impacts would be less than significant without mitigation.

Threshold 3:	*Substantially degrade the existing visual character or quality of the site and its surroundings.*

Impact AES-2 **The proposed project would convert the existing rural character of the site to a more urban character. However, the project location makes it a natural extension of the existing urban landscape of lower Carmel Valley. By adhering to the CVMP policy CV-1.1, the development would maintain the rural character of the region and thus would not degrade the existing visual character or quality of the site. Impacts would be Class III, *less than significant*.**

CVMP Policy CV-1.1 is intended to preserve the rural character of the Carmel Valley by requiring that all development follow a rural architectural theme and be subject to design review (County of Monterey, 2013). Further, the site is within a Design Control Zoning District, which requires submittal and approval of a Design Approval Application prior to issuance of a building permit. The proposed project would involve the replacement of row crop agriculture with 31 residences. However, the proposed development scheme would maintain the rural character of the area and would be consistent with nearby residential development. Figures 2-4a and 2-4b in Section 2.0, *Project Description,* show the preliminary architectural renderings of the proposed residences. The proposed architecture would preserve the rural character of the site with the low roofs and single family homes with ample connection to the outside with

windows, patios, and balconies. Further, the subtle color pallet of red roofs and grey exterior walls would not distract from the rural setting of adjacent properties. Final design of the proposed residences would be subject to review and approval by the County of Monterey to ensure adherence to policy CV-1.1 and any other design requirements.

Although the project site is undeveloped and retains a rural character, there is existing urban development adjacent to the project site, including commercial development along Carmel Rancho Boulevard west of the site and two story townhomes south of Rio Road. Further to the north is the Cottages of Carmel retirement community development. The proposed residences would be similar or lower in height compared to nearby development, with no structures exceeding two stories. Further, the proposed density of development in the project would be similar to the residential development south of Rio Road and would be lower density than the Cottages of Carmel to the north of the project site. Therefore, the project would be consistent with the scale and character surrounding land uses.

The preliminary design and proposed density of the project would be a natural extension of existing development surrounding the site. Further, the architectural review required by the project zoning and by CVMP policy CV-1.1 would ensure that the project adequately maintains the rural character of the area. Therefore, while the project would represent a change in character of the site, it would not constitute a substantial degradation of visual character or quality. Thus, impacts to the visual character and quality of the site and surroundings would be less than significant.

Mitigation Measures. No mitigation is required.

Significance After Mitigation. Impacts would be less than significant without mitigation.

Threshold 4:	*Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area.*

Impact AES-3 The proposed project would introduce new sources of light to the project area. Impacts would be Class II, *significant but mitigable.*

The proposed project would replace row crop agriculture with 31 residences. The project access route – a looped road with two entrances from Val Verde Drive – would include street lighting. Exterior lighting at the proposed residences would also lead to an increase in nighttime light generated at the site. As discussed above in Section 4.1.1(e) (Regulatory Setting), the Monterey County zoning code does not include lighting requirements for the project area. Therefore, Mitigation Measure AES-1 is required to avoid potential impacts of new sources of light created by the project.

The project also would introduce on-site sources of glare, including headlights on cars and solar reflections on the surface of cars in driveways, and solar reflections from windows. However, any glare from cars or windows would be temporary, similar to existing glare from surrounding urban properties along Carmel Rancho Boulevard, and filtered by intervening

landscaping with trees and shrubs on the project site. Therefore, the project would not cause substantial glare.

Mitigation Measures. The following mitigation is required.

AES-3 **Downcast Lighting**. All street lighting and exterior lighting on residences shall be downcast with full cutoff fixtures and low mounted to reduce light trespass onto adjacent properties. The proposed lighting plan shall be submitted to and approved by the Monterey County RMA – Planning Department prior to issuance of grading permits.

Significance After Mitigation. Implementation of Mitigation Measure AES-3 would reduce nighttime lighting-related impacts to a less than significant level.

c. Cumulative Impacts. The geographic extent for this cumulative impact analysis includes the Carmel Valley. This geographic extent is appropriate for the issue of aesthetics because the project's aesthetic impacts are fairly localized and site-specific. As shown in Table 3-1 in Section 3.0, *Environmental Setting*, past, present, and reasonably foreseeable future projects in Carmel Valley would add an estimated 524 dwelling units, 15,500 square feet of commercial space, and 16 hotel rooms within the Carmel Valley. This cumulative development has the potential to substantially adversely affect existing scenic vistas, and would serve to transition the aesthetic character of viewsheds within the Carmel Valley from a rural, agricultural character to a more developed character. Cumulative impacts to scenic vistas and visual character as a result of this transition to a more urbanized character would be potentially significant. Given that the proposed project would result in less than significant impacts to scenic vistas and visual character within this geographic extent, the project's contribution to this cumulative impact would be less than significant.

With respect to light and glare impacts, while the project would create a new source of light and glare, implementation of required mitigation to use only downcast exterior lighting would reduce impacts related to night lighting to a less than significant level. It is reasonable to conclude that similar measures would be imposed on other cumulative projects within the Carmel Valley, and as such, any cumulative light and glare impacts would be reduced to a less than significant level and that the project would not have any cumulatively considerable contribution to any such impact.

This page intentionally left blank.

4.2 AIR QUALITY

4.2.1 Summary

Table 4.2-1 summarizes the identified environmental impacts, proposed mitigation measures, and residual impacts of the proposed project with regard to air quality. Additional detail is provided in Section 4.2.3 (Impact Analysis).

Table 4.2-1
Impact and Mitigation Summary: Air Quality

Impact	Mitigation Measures	Residual Impact
Impact AQ-1 The proposed project would introduce additional housing to the area and contribute to population growth. However, growth would be within the growth assumptions of the 2008 AQMP. This impact would be Class III, *less than significant*.	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact AQ-2 Construction of the proposed project would result in the temporary generation of air pollutants, which would affect local air quality. The emissions would be short term and no criteria pollutants would exceed MBARD thresholds. Impacts would be Class III, *less than significant.*	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact AQ-3 Operational emissions would not exceed MBARD's daily thresholds. Impacts would be Class II, *less than significant.*	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact AQ-4 The proposed project would not degrade service levels at study area intersections such that CO hotspots would be created. Impacts related to CO hotspots would be Class III, *less than significant.*	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact AQ-5 The project would not expose sensitive receptors to substantial pollutant concentrations associated with construction dust or toxic air contaminants. Impacts related to these localized pollutants would be Class III, *less than significant.*	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact AQ-6 The proposed project would not create objectionable odors that would affect neighboring properties. Impacts related to odors would be Class III, *less than significant.*	No mitigation is required.	Impacts would be less than significant without mitigation.

4.2.2 Setting

a. Climate and Topography. The project site is located within the North Central Coast Air Basin (NCCAB), which includes Monterey, San Benito, and Santa Cruz counties. The NCAAB includes an area of approximately 5,159 square miles along the central coast of California. The project site is located near the coast in the central portion of the air basin. The Monterey Bay Air Resources District (MBARD) is responsible for local control and monitoring of criteria air pollutants throughout the NCCAB.

Climate, or the average weather condition, affects air quality in several ways. Wind patterns can remove or add air pollutants emitted by stationary or mobile sources, Inversion, a condition where warm air traps cooler air underneath it, can hold pollutants near the ground by limiting upward mixing (dilution). Topography also plays a part, as valleys often trap emissions by limiting later dispersal.

Winds originating in the San Francisco Bay Area Air Basin (SFBAAB) often transport pollutants into the NCCAB, where surface winds move the pollutants to the eastern portion of the NCAAB. The transport of pollutants from SFBAAB greatly influences pollutant levels in the NCCAB, assessments from 1994 and 1995 indicate that 50% of NCCAB exceedances are the result of transport from the SFBAAB (MBARD, 2013).

Regional temperatures in the area range from the mid-forties to the low seventies (Fahrenheit) and precipitation averages approximately 19.73 inches per year (1906-2014) (Western Regional Climate Center, 2014). August, September, and October are typically the warmest months.

b. Air Pollutants of Primary Concern. The state and federal Clean Air Acts mandate the control and reduction of certain air pollutants. Under these Acts, the U.S. Environmental Protection Agency (USEPA) and the California Air Resources Board (CARB) have established ambient air quality standards for certain "criteria" pollutants. Ambient air pollutant concentrations are affected by the rates and distributions of corresponding air pollutant emissions, as well as by the climactic and topographic influences discussed above. The primary determinant of concentrations of non-reactive pollutants (such as CO and PM_{10}) is proximity to major sources. Ambient CO levels in particular usually closely follow the spatial and temporal distributions of vehicular traffic. A discussion of primary criteria pollutants is provided below.

Ozone. Ozone is a colorless gas with a pungent odor. Most ozone in the atmosphere is formed as a result of the interaction of ultraviolet light, reactive organic gases (ROG), and oxides of nitrogen (NO_X). ROG (the organic compound fraction relevant to ozone formation, and sufficiently equivalent for the purposes of this analysis to volatile organic compounds, or VOC[1]) is composed of non-methane hydrocarbons (with some specific exclusions), and NO_X is made of different chemical combinations of nitrogen and oxygen, mainly NO and NO_2. A highly reactive molecule, ozone readily combines with many different components of the atmosphere. Consequently, high levels of ozone tend to exist only while high ROG and NO_X levels are present to sustain the ozone formation process. Once the precursors have been depleted, ozone levels rapidly decline. Because these reactions occur on a regional rather than local scale, ozone is considered a regional pollutant.

[1] ROG is equivalent to volatile organic compounds (VOC) per MBARD Rule 101, 2.32

Carbon Monoxide. Carbon monoxide (CO) is an odorless, colorless, gas that is emitted by mobile and stationary sources as a result of incomplete combustion of hydrocarbons or other carbon-based fuels. CO causes a number of health problems including fatigue, headache, confusion, and dizziness. The incomplete combustion of petroleum fuels in on-road vehicles and at power plants is a major cause of CO. CO is also produced during the winter from wood stoves and fireplaces. CO tends to dissipate rapidly into the atmosphere; consequently, violations of the state CO standard are generally associated with the major roadway intersections during peak hour traffic conditions.

Localized carbon monoxide "hotspots" can occur at intersections with heavy peak hour traffic. Specifically, hotspots can be created at intersections where traffic levels are sufficiently high such that the local CO concentration exceeds the federal Ambient Air Quality Standards (AAQS) of 35.0 parts per million (ppm) or the state AAQS of 20.0 ppm.

Nitrogen Dioxide. Nitrogen dioxide (NO_2) is a by-product of fuel combustion, with the primary source being motor vehicles and industrial boilers and furnaces. The principal form of nitrogen oxide produced by combustion is nitric oxide (NO), but NO reacts rapidly to form NO_2, creating the mixture of NO and NO_2 commonly called NO_X. Nitrogen dioxide is an acute irritant. A relationship between NO_2 and chronic pulmonary fibrosis may exist, and an increase in bronchitis in young children at concentrations below 0.3 parts per million (ppm) may occur. Nitrogen dioxide absorbs blue light and causes a reddish brown cast to the atmosphere and reduced visibility. It can also contribute to the formation of PM_{10} and acid rain.

Particulate Matter. Suspended particulate matter (airborne dust) consists of particles small enough to remain suspended in the air for long periods. Fine particulate matter includes particles small enough to be inhaled, pass through the respiratory system, and lodge in the lungs, with resultant health effects. Particulate matter can include materials such as sulfates and nitrates, which are particularly damaging to the lungs. Health effects studies resulted in revision of the Total Suspended Particulate (TSP) standard in 1987 to focus on particulates that are small enough to be considered "inhalable," i.e. 10 microns or less in size (PM_{10}). PM_{10} arises from sources such as road dust, diesel soot, combustion products, construction operations, and dust storms. PM_{10} scatters light and significantly reduces visibility. In addition, these particulates penetrate the lungs and can potentially damage the respiratory tract. On June 19, 2003, CARB adopted amendments to the statewide 24-hour particulate matter standards based upon requirements set forth in the Children's Environmental Health Protection Act (SB 25).

In July of 1997, a further revision of the federal standard added criteria for $PM_{2.5}$, reflecting recent studies that suggested that particulates less than 2.5 microns in diameter are of particular concern. Due to increased concerns over health impacts related to fine particulate matter (particulate matter 2.5 microns in diameter or less), both State and federal $PM_{2.5}$ standards have been created. These standards were established due to increasing concerns that previous standards were inadequate and the statewide potential for significant health impacts associated with fine particulate matter exposure was determined to be large and wide-ranging. Fine particulate matter impacts primarily affect infants, children, the elderly, and those with pre-existing cardiopulmonary disease.

CARB and the USEPA establish ambient air quality standards for major pollutants at thresholds intended to protect public health. Federal and state standards have been established for ozone, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), lead, and fine particulates (PM_{10} and $PM_{2.5}$). Table 4.2-2 summarizes the California Ambient Air Quality Standards (CAAQS) and the National Ambient Air Quality Standards (NAAQS) for each of these pollutants. Standards have been set at levels intended to be protective of public health. California standards are more restrictive than federal standards for each of these pollutants except for lead and the eight-hour average for CO. Depending on whether the standards are met or exceeded, the local air basin is classified as in "attainment" or "non-attainment." Some areas are unclassified, which means no monitoring data are available. Unclassified areas are considered to be in attainment.

Asbestos. Asbestos is a highly friable material often found in older buildings (pre-1979), typically used as insulation in walls or ceilings. It was formerly popular as an insulating material; however, it can pose a health risk when very small particles become airborne. In conformance with the Clean Air Act, USEPA established the National Emissions Standards for Hazardous Air Pollutants (NESHAP) to protect the public. The asbestos regulations under NESHAP control work practices during the demolition and renovation of institutional, commercial or industrial structures. Following identification of friable asbestos the federal OSHA require that asbestos trained and certified abatement personnel perform asbestos abatement and all asbestos containing material (ACM) removed from on-site structures shall be hauled to a licensed receiving facility and disposed of under proper manifest by a transportation company certified to handle asbestos. Disposal of any ACM is also regulated by the County Fire Department and specific requirements are determined during the permitting process.

Lead. Lead is a metal found naturally in the environment, as well as in manufacturing products. The major sources of lead emissions historically have been mobile and industrial sources. As a result of the phase-out of leaded gasoline, as discussed below, metal processing is currently the primary source of lead emissions. The highest level of lead in the air is generally found near lead smelters. Other stationary sources are waste incinerators, utilities, and lead-acid battery manufacturers.

In the past, mobile sources were the main contributor to ambient lead concentrations in the air. In the early 1970s, USEPA set national regulations to gradually reduce the lead content in gasoline. In 1975, unleaded gasoline was introduced for motor vehicles equipped with catalytic converters. USEPA completed the ban prohibiting the use of leaded gasoline in highway vehicles in December 1995. As a result of USEPA's regulatory efforts to remove lead from gasoline, lead concentrations have declined substantially over the past several decades. The most dramatic reductions in lead emissions occurred prior to 1990 in the transportation sector due to the removal of lead from gasoline sold for most highway vehicles. Lead emissions were further reduced substantially between 1990 and 2008, with substantial reductions occurring in the metal industries, at least in part as a result of national emissions standards for hazardous air pollutants.

Table 4.2-2
Current Federal and State Ambient Air Quality Standards

Pollutant	Averaging Time	Federal Primary Standards	California Standard
Ozone	1-hour	--	0.09 ppm
	8-hour	0.070 ppm	0.07 ppm
Carbon Monoxide	1-hour	35 ppm	20 ppm
	8-hour	9 ppm	9 ppm
Nitrogen Dioxide	1-hour	0.1 ppm	0.18 ppm
	Annual	0.053 ppm	0.03 ppm
Sulfur Dioxide	1-hour	0.075 ppm	0.25 ppm
	3-hour	0.5 ppm	--
	24-hour	0.14 ppm	0.04 ppm
PM_{10}	24-hour	150 µg/m^3	50 µg/m^3
	Annual	--	20 µg/m^3
$PM_{2.5}$	24-hour	35 µg/m^3	--
	Annual	12 µg/m^3	12 µg/m^3
Lead	30-Day Average	--	1.5 µg/m^3
	3-Month Average	0.15 µg/m^3	--

ppm=parts per million
µm/m^3=micrograms per cubic meter
Source: CARB, 2016.

c. Current Ambient Air Quality. Local air districts and CARB monitor ambient air quality to assure that air quality standards are met, and if they are not met, to also develop strategies to meet the standards. Air quality monitoring stations measure pollutant ground-level concentrations (typically, ten feet above ground level). Depending on whether the standards are met or exceeded, the local air basin in classified as in "attainment" or "non-attainment." Some areas are unclassified, which means no monitoring data are available. Unclassified areas are considered to be in attainment. Table 4.2-3 summarizes the state and federal attainment status for the criterial pollutants in the NCCAB.

Table 4.2-3
Attainment Status of the North Central Coast Air Basin

Pollutant	State Standard[1]	Federal Standard
Ozone (0_3)	**Nonattainment**[2]	Attainment/Unclassified[3]
Inhalable Particulates (PM_{10})	**Nonattainment**	Attainment
Fine Particulates ($PM_{2.5}$)	Attainment	Attainment/Unclassified[4]
Carbon Monoxide (CO)	Attainment (Monterey County)	Attainment/Unclassified
Nitrogen Dioxide (NO_x)	Attainment	Attainment/Unclassified[5]
Sulfur Dioxide (SO_x)	Attainment	Attainment[6]
Lead	Attainment	Attainment/Unclassified[7]

Source: MBARD (formerly MBUAPCD), 2015
Notes:
[1]State designations based on 2010 to 2012 air monitoring data.
[2]Effective July 26, 2007, the CARB designated the NCCAB a nonattainment area for the State ozone standard, which was revised in 2006 to include an 8-hour standard of 0.70 ppm.
[3]On March 12, 2008, USEPA adopted a new 8-hour ozone standard of 0.075 ppm. In April 2012, USEPA designated the NCCAB attainment/unclassified based on 2009-2011 data.
[4]This includes the 2006 24-hour standard of 35 µg/m^3 and the 2012 annual standard of 12 µg/m^3.
[5]In 2012, USEPA designated the entire state as attainment/unclassified for the 2010 NO_2 standard.
[6]In June 2011, the CARB recommended to USEPA that the entire state be designated as attainment for the 2010 primary SO_2 standard. Final designations to be addressed in future USEPA actions.
[7]On October 15, 2008 USEPA substantially strengthened the national ambient air quality standard for lead by lowering the level of the primary standard from 1.5 µg/m^3 to 1.5 µg/m^3. Final designations were made by USEPA in November 2011.
*[8]Nonattainment designations are highlighted in **Bold**.*

As shown in Table 4.2-3, although the NCAAB is in attainment or unclassifiable of all federal ambient air quality standards (AAQS), it is designated as non-attainment with respect to the more stringent state PM_{10} standard and the state's eight-hour ozone standard. The federal eight-hour ozone standard was lowered to 0.07 ppm in October 2015; however, the federal attainment status has not been changed.

Ambient air quality is monitored at six MBARD-operated monitoring stations throughout the NCCAB, located in Carmel Valley, Salinas, Hollister, Santa Cruz, King City, and Felton. In addition, the National Parks Service operates a station at the Pinnacles National Park. Table 4.2-4 summarizes the representative annual air quality data for the project vicinity over the past three years (2013-2015). The nearest monitoring stations to the project site are Carmel Valley (approximately ten miles southeast) and Salinas (approximately 19 miles northeast.

The primary pollutants of concern for the NCCAB are ozone and PM_{10}, as those are the pollutants for which the district is in nonattainment. As indicated in Table 4.2-4, there were no federal or state ozone exceedances at the nearest NCCAB monitoring station in 2012, 2013, or 2014. The state and federal standards for PM_{10} were also not exceeded at the nearest NCCAB monitoring station in 2013, 2014, and 2015. The federal standard for $PM_{2.5}$ was exceeded not exceeded in 2013 or 2014 and was exceeded once in 2015.

Table 4.2-4
Ambient Air Quality Data

Pollutant	2013	2014	2015
Ozone[1,2] (ppm), Worst Hour	0.072	0.078	0.071
Number of days of State exceedances (>0.09 ppm)	0	0	0
Ozone[2] (ppm), 8-hr average	0.068	0.070	0.066
Number of days of State exceedances (>0.07 ppm)	0	0	0
Number of days of Federal exceedances (>0.08 ppm)	0	0	0
Carbon Monoxide[3] (ppm), Highest 8-Hour Average	*	*	*
Number of days of above State or Federal standard (>9.0 ppm)	*	*	*
Particulate Matter <10 microns[4,5,] $\mu g/m^3$, Worst 24 Hours	78.2	99.2	72.6
Number of days above State standard (>50 $\mu g/m^3$)	*	*	*
Number of days above Federal standard (>150 $\mu g/m^3$)	0	0	0
Particulate Matter <2.5 microns[2,4], $\mu g/m^3$, Worst 24 Hours	33.7	16.3	43.2
Number of days above Federal standard (>65 $\mu g/m^3$)	0	0	1

**There was insufficient (or no) data available to determine the value.*
Source: CARB, 2016.

[1] *Maximum concentration is measured over the same period as the California Standards.*
[2] *Ozone data and $PM_{2.5}$ data collected from Carmel Valley Monitoring Station*
[3] *Carbon monoxide data collected from Salinas Monitoring Station*
[4] *PM_{10} and $PM_{2.5}$ exceedances are derived from the number of samples exceeded, not days.*
[5] *PM_{10} data collected from King City-415 Pearl Street Monitoring Station*

d. Toxic Air Contaminants. According to Section 39655 of the California Health and Safety Code, a toxic air contaminant is "an air contaminant which may cause or contribute to an increase in mortality or an increase in serious illness, or which may pose a present or potential hazard to human health." In addition, 189 substances that have been listed as federal hazardous

air pollutants (HAPs) pursuant to Section 7412 of Title 42 of the United States Code are TACs under the state's air toxics program pursuant to Section 39657 (b) of the California Health and Safety Code.

TACs can cause various cancers, depending on the particular chemicals, their type and duration of exposure. Additionally, some of the TACs may cause other health effects with short or long term exposure. The ten TACs posing the greatest health risk in California are acetaldehyde, benzene, 1-3 butadiene, carbon tetrachloride, hexavalent chromium, para-dichlorobenzene, formaldehyde, methylene chloride, perchlorethylene, and diesel particulate matter. Mobile sources of TACs include freeways and other roads with high traffic volumes (urban roads with traffic volumes exceeding 100,000 vehicles per day, or rural roads with volumes greater than 50,000 vehicles per day), while stationary sources include distribution centers, rail yards, ports, refineries, dry cleaners, and large gas dispensing facilities.

e. Regulatory Setting. This analysis has been prepared pursuant to California Environmental Quality Act (CEQA) of 1970 and associated Guidelines (Public Resources Code 21000 et seq. and California Code of Regulations, Title 14, Chapter 3 section s 15000 – 15387) and in accordance with local, state and federal laws, including those administered by MBARD, CARB, and the USEPA. The principal air quality regulatory mechanisms include the following:

- *Federal Clean Air Act (FCAA), in particular, the 1990 amendments;*
- *California Clean Air Act (CCAA);*
- *California Health and Safety Code (H&SC), in particular, Chapter 3.5 (Toxic Air Contaminants) (H&SC Section 39650 et. seq.) and Part 6 (Air Toxics "Hot Spots" Information and Assessment) (H&SC Section 44300 et. seq.).*
- *MBARD's Rules and Regulations and air quality planning documents:*
- *MBARD Rule 200 (Permits Required), Rule 400 (Visible Emissions), Rule 402 (Nuisances), Rule 423 (New Source Performance Standards) incorporates Part 60, Chapter I, Title 40 of the Code of Federal Regulations, Rule 425 (Use of Cutback Asphalt)*
- *2008 Air Quality Management Plan – Adopted August 2008 for achieving the 2006 California ozone standard*
- *2012 Triennial Plan Revision – Adopted April 2013 to revise the 2008 AQMP progress towards attaining California ozone standards*
- *2007 Federal Maintenance Plan – Adopted May 2007 for maintaining the 1997 federal ozone standard*
- *2005 Particulate Matter Plan – Adopted December 2005 for particulate matter made in response to Senate Bill 656.*
- *2008 MBUAPCD California Environmental Quality Act Air Quality Guidelines most recently revised in 2008*

Federal and State. The federal and state governments have been empowered by the federal and state Clean Air Acts to regulate the emission of airborne pollutants and have established ambient air quality standards for the protection of public health. The USEPA is the federal agency designated to administer air quality regulation, while the CARB is the state equivalent in California. Local control in air quality management is provided by CARB through county-level or regional (multi-county) air pollution control districts (APCDs). CARB establishes air quality standards and is responsible for control of mobile emission sources, while

the local APCDs are responsible for enforcing standards and regulating stationary sources. CARB has established 14 air basins statewide.

Federal Clean Air Act. USEPA is charged with implementing national air quality programs. USEPA's air quality mandates are drawn primarily from the federal Clean Air Act (CAA). The CAA was passed in 1963 by the U.S. Congress and has been amended several times. The 1970 CAA amendments strengthened previous legislation and laid the foundation for regulatory scheme of the 1970s and 1980s. In 1977, Congress again added several provisions, including non-attainment requirements for areas not meeting NAAQS and the Prevention of Significant Deterioration program. The 1990 CAA amendments represent the latest in a series of federal efforts to regulate the protection of air quality in the U.S. The CAA allows states to adopt more stringent standards or to include other pollution species.

NAAQS. As discussed above, the federal CAA requires USEPA to establish primary and secondary NAAQS for a number of criterial pollutants. The air pollutants for which standards have been established are considered the most prevalent air pollutants that are known to be hazardous to human health. NAAQS have been established for the following pollutants: O_3, CO, SO_2, PM_{10}, $PM_{2.5}$, and lead (Pb).

Title III of the Federal CAA. Hazardous air pollutants (HAPs) are the air contaminants identified by USEPA as known or suspected to cause cancer, other serious illnesses, birth defects, or death. The federal CAA requires USEPA to set standards for these pollutants and reduce emissions of controlled chemicals. Specifically, Title III of the CAA requires USEPA to promulgate National Emissions Standards for Hazardous Air Pollutants (NESHAP) for certain categories of sources that emit one or more pollutants that are identified as HAPs. The federal CAA also requires USEPA to set standards to control emissions of HAPs through mobile source control programs. These include programs that reformulated gasoline, national low emissions vehicle standards, Tier 2 motor vehicle emission standards, gasoline sulfur control requirements, and heavy-duty engine standards.

HAPs tend to be localized and are found in relatively low concentrations in ambient air. However, they can result in adverse chronic health effects if exposure to low concentrations occurs for long periods of time. Many HAPs originate from human activities, such as fuel combustion and solvent use. Emission standards may differ between "major sources" and "area sources" of the HAPs/TACs. Under the federal CAA, major sources are defined as stationary sources with the potential to emit more than 10 tons per year (tpy) of any one HAP or more than 25 tpy of any combination of HAPs; all other sources are considered area sources. Mobile source air toxics (MSATs) are a subset of the 188 HAPs. Of the 21 HAPs identified by the USEPA as MSATs, a priority list of six HAPs were identified that include: diesel exhaust, benezene, formaldehyde, acetaldehyde, acrolein, and 1,3-butadiene. While vehicle miles traveled in the United States is expected to increase by 64% over the period from 2000 to 2020, emissions of MSATs are anticipated to decrease substantially as a result of efforts to control mobile source emissions (by 57-67% depending on the contaminant).

California Clean Air Act. The CCAA, signed into law in 1988, requires all areas of the State to achieve and maintain the CAAQS by the earliest practical date. The California Air Resources Board (CARB) is the State air pollution control agency and is a part of the California Environmental Protection Agency (Cal EPA). CARB is the agency responsible for coordination

and oversight of the State and local air pollution control programs in California, and for implementing the requirements of the CCAA. CARB oversees local district compliance with California and federal laws, approves local air quality plans, submits the SIPs to the USEPA, monitors air quality, determines and updates area designations and maps, and sets emissions standards for new mobile sources, consumer products, small utility engines, off-road vehicles, and fuels.

CAAQS. The CCAA requires CARB to establish CCAQS. Similar to the NAAQS, CAAQS have been established for the following pollutants: O_3, CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, Pb, vinyl chloride, hydrogen sulfide, sulfates, and visibility-reducing particulates. In most cases, the CAAQS are more stringent than the NAAQS pollutants. The CCAA requires that all local air districts in the State endeavor to achieve and maintain the CAAQS by the earliest practical date. The CAA specifies that local air districts should focus particular attention on reducing the emissions from transportation and area-wide emission sources, and provides districts with the authority to regulate indirect sources.

Tanner Air Toxics Act and Air Toxics Hot Spots Information and Assessment Act. Toxic Air Contaminants (TACs) in California primarily are regulated through the Tanner Air Toxics Act (AB1807) and the Air Toxics Hot Spots Information and Assessment Act of 1987 (AB 2588) (Hot Spots Act). As discussed above, HAPs/TACs are a broad class of compounds known to cause morbidity or mortality (cancer risk). HAPs/TACs are found in ambient air, especially in urban areas, and are caused by industry, agriculture, fuel combustion, and commercial operations (e.g., dry cleaners). Because chronic exposure can result in adverse health effects, TACs are regulated at the regional, State, and federal level.

AB 1807 sets forth a formal procedure for CARB to designate substances as TACs. Research, public participation, and scientific peer review are necessary before CARB can designate a substance as a TAC. To date, CARB has identified more than 21 TACs and adopted USEPA's list of HAPs as TACs. In 1998, diesel particulate matter (DPM) was added to CARB's list of TACs. Once a TAC is identified, CARB adopts an Airborne Toxic Control Measure for sources that emit that particular TAC. If a safe threshold exists at which no toxic effect occurs from a substance, the control measure must reduce exposure below that threshold. If no safe threshold exists, the measure must incorporate Best Available Control Technology (BACT) to minimize emissions.

The Hot Spots Act requires for existing facilities that emit toxic substances above a specified level to prepare a toxic emissions inventory and a risk assessment if the emissions are significant, notify the public of significant risk levels, and prepare and implement risk reduction measures.

Diesel Exhaust and Diesel Particulate Matter. Diesel exhaust is the predominant TAC in urban air and is estimated to represent about two-thirds of the cancer risk from TACs (based on the statewide average). According to CARB, diesel exhaust is a complex mixture of gases, vapors, and fine particles. This complexity makes the evaluation of health effects of diesel exhaust a complex scientific issue. Some chemicals in diesel exhaust, such as benzene and formaldehyde, have been previously identified as TACs by CARB, and are listed as carcinogens either under State Proposition 65 or under the Federal Hazardous Air Pollutants programs.

CARB reports that recent air pollution studies have shown an association that diesel exhaust and other cancer-causing toxic air contaminants emitted from vehicles are responsible for much of the overall cancer risk from TACs in California. Particulate matter emitted from diesel-fueled engines (DPM) was found to comprise much of that risk. CARB has adopted and implemented a number of regulations for stationary and mobile sources to reduce emissions of DPM. Several of these regulatory programs affect medium and heavy duty diesel trucks that represent the bulk of DPM emissions from California highways. These regulations include the solid waste collection vehicle (SWCV) rule, in-use public and utility fleets, and the heavy-duty diesel truck and bus regulations. In 2011, CARB approved the latest regulation to reduce emissions of DPM and nitrogen oxides from existing on-road heavy-duty diesel fueled vehicles. The regulation requires affected vehicles to meet specific performance requirements between 2012 and 2023, with all affected diesel vehicles required to have 2010 model-year engines or the equivalent by 2023. These requirements are phased in over compliance period and depend on the model year of the vehicle. With implementation of CARB's Risk Reduction Plan, DPM concentrations are expected to be reduced by 85% in 2020 from the estimated year 2000 level. As emissions are reduced, risks associated with exposure to emissions also are expected to be reduced.

CARB Air Quality and Land Use Handbook. In April 2005, CARB released the final version of its *Air Quality and Land Use Handbook: A Community Health Perspective.* This guidance document is intended to encourage local land use agencies to consider the risks from air pollution before they approve the siting of sensitive land uses (e.g., residences) near sources of air pollution, particularly TACs (e.g., freeway and high traffic roads, commercial distribution centers, rail yards, ports, refineries, dry cleaners, gasoline stations, and industrial facilities). These advisory recommendations include general setbacks or buffers from air pollution sources. However, unlike industrial or stationary sources of air pollution, the siting of new sensitive land uses does not require air quality permits or approval by air districts, and as noted above, the CARB handbook provides guidance only rather than binding regulations.

CAPCOA Health Risk Assessments for Proposed Land Use Projects. The California Air Pollution Control Officer's Association (CAPCOA) is a consortium of air district managers throughout California, which provide guidance material to addressing air quality issues in the State. As a follow up to CARB's 2005 *Air Quality and Land Use Handbook*, CAPCOA prepared the *Health Risk Assessments for Proposed Land Use Projects*. This guidance document was released to ensure that the health risk of projects were identified, assessed, and avoided or mitigated, if feasible, through the CEQA process. The CAPCOA guidance document provides recommended methodologies for evaluating health risk impacts for development projects.

Regional. The MBARD regulates air quality in the NCCAB, and is responsible for attainment planning related to criteria air pollutants, and for district rule development and enforcement. It also reviews air quality analyses prepared for CEQA assessments, and has published the *CEQA Air Quality Guidelines* documents (last revised February 2008). The purpose of the Guidelines is to assist in the review and evaluation of air quality impacts from projects which are subject to CEQA. The Guidelines are an advisory document intended to provide lead agencies, consultants, and project proponents with uniform procedures for assessing potential air quality impacts and preparing the air quality section of environmental documents. The Guidelines are also intended to help these entities anticipate areas of concern from the MBARD in its role as a lead, commenting, and/or responsible agency for air quality.

Air Quality Management Plan. In accordance with the California Clean Air Act, the MBARD has developed the *2008 Air Quality Management Plan for the Monterey Bay Region* (2008b). The 2008 AQMP is a transitional plan shifting focus of MBARD's efforts from achieving the 1-hour component of the state ozone AAQS to achieving the 8-hour ozone requirements. The plan includes an updated air quality trends analysis which reflects both the 1- and 8-hour standards, as well as an updated emission inventory, which includes the latest information on stationary, area and mobile emission sources.

In April 2013, MBARD adopted the *2012 Triennial Plan Revision* (2012 AQMP Revision), which assesses and updates elements of the 2008 AQMP, including the air quality trends analysis, emission inventory, and mobile source programs. The 2012 AQMP Revision only addresses attainment of the state ozone standard. In 2012, USEPA designated the NCCAB as attainment of the current national 8-hour ozone standard of 0.075 ppm. In October 2015 the national ozone standard was reduced to 0.070 ppm; however, the NCCAB has not been designated as nonattainment for the federal ozone standard.

f. Sensitive Receptors. Certain population groups are more sensitive to air pollution than the general population; in particular, children, the elderly, and acutely ill and chronically ill persons, especially those with cardio-respiratory diseases, are considered sensitive receptors. Sensitive receptors that are in proximity to localized sources of particulate matter, toxics, and CO are of particular concern. As described in the MBARD's *2008 CEQA Guidelines,* a sensitive receptor is defined as: any residence including private homes, condominiums, apartments, and living quarters; education resources such as preschools and kindergarten through grade twelve (K-12); daycare centers; and health care facilities such as hospitals or retirement and nursing homes.

MBARD recommends evaluating potential impacts to sensitive receptors within 1,000 feet of the project site. Single family residences are located to the north and south of the project site. The nearest residence is approximately 50 feet to the south of the project site. There is also an existing residence located on the project site, which would be removed as a result of the project. For the purpose of this analysis, it is assumed this residence would be vacated prior to any site disturbance.

4.2.3 Impact Analysis

a. Methodology and Significance Thresholds. The analysis of the project's air quality impacts follows the guidance and methodologies recommended in the MBARD *CEQA Air Quality Guidelines* (February 2008) and Appendix G of the *State CEQA Guidelines*.

Appendix G of the *State CEQA Guidelines* contains the following checklist of effects that may be deemed potentially significant:

1. *Conflict with or obstruct implementation of the applicable air quality plan;*
2. *Violate any air quality standards or contribute substantially to an existing or projected air quality violation;*
3. *Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed qualitative thresholds for ozone precursors);*

4. *Expose sensitive receptors to substantial pollutant concentrations; and/or*
5. *Create objectionable odors affecting a substantial number of people.*

The *State CEQA Guidelines* further state that the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the determinations above.

Thresholds of Significance. The MBARD has issued criteria for determining the level of significance for project specific impacts within its jurisdiction in accordance with the above thresholds. Based on criteria applied in or adapted from the MBARD *Guidelines,* the proposed project's impacts on criteria air pollution would be significant if the project would:

- *Be inconsistent with the adopted AQMP.*
- *During construction:*
- *Cause a violation of PM_{10} AAQS at nearby or upwind of sensitive receptors, based on whether the project would:*
- *Emit greater than 82 lb/day of PM_{10} if located nearby or upwind of sensitive receptors (note: projects which require minimal earthmoving on 8.1 or more acres per day or grading and excavation on 2.2 or more acres per day are likely to exceed this threshold); or*
- *Use equipment that is not "typical construction equipment" as specified in Section 5.3 of the MBARD CEQA Guidelines.*
- *During operations:*
- *Generate direct (area source or stationary) plus indirect (operational or mobile) emissions of either ROG or NO_X that exceed 137 lbs/day;*
- *Generate on-site emissions of PM_{10} exceeding 82 lbs/day;*
- *Generate direct emissions of CO exceeding 550 lbs/day;*
- *Generate direct emissions of SO_X exceeding 150 lbs/day.*
- *Cause or substantially contribute to a violation of a CO standard.*

The MBARD's *Guidelines* indicate that the following traffic effects should be assumed to generate a significant CO impact, unless CO dispersion modeling demonstrates otherwise:

- *Intersections or road segments that currently operate at LOS D or better would operate at LOS E or F with addition of the project's traffic;*
- *V/C ratio at intersection or road segments at LOS E or F increases by 0.05 or more;*
- *Delay at intersection at LOS E or F increases by 10 seconds or more; or*
- *Reserve capacity at unsignalized intsersection at LOS E or F decreases by 50 or more.*

Air Quality Management Plan Consistency. Residential projects which increase population will also generate population-related emissions (e.g., motor vehicles, residential heating and cooling emissions). A project would conflict with or obstruct implementation of the *2008 Air Quality Management Plan* (2008 AQMP) and the *2012 Triennial Plan Revision* (2012 AQMP Revision) for the Monterey Bay Region if it is inconsistent with the plan's growth assumptions, in terms of population, employment, or regional growth in vehicle miles traveled. These population forecasts were developed, in part, using data obtained from local jurisdictions on projected land uses and population projections identified in community plans. Projects that result in an increase in population that is inconsistent with local community plans would be considered inconsistent with the AQMP. MBARD utilizes dwelling units to determine

consistency rather than population because dwelling units are closely related to population and jurisdictions have the ability to track the housing stock in their area. To determine a project's consistency, a project's proposed dwelling units are compared to the existing and approved dwelling units within the jurisdiction. If the jurisdiction dwelling units, including the proposed project, are less than the forecast in the AQMP, then the project is consistent. If the jurisdiction dwelling units, including the proposed project, exceed the forecast in the AQMP, then the project is not consistent.

Methodology. The analysis of air quality impacts conforms to the methodologies recommended in the MBARD's *CEQA Air Quality Guidelines* (2008a). The handbook includes thresholds for emissions associated with both construction and operation of proposed projects.

Construction Emissions. The California Emissions Estimator Model (CalEEMod, version 2013.2.2) was used to estimate construction emissions from off-road equipment and fugitive dust generated during the construction phase. CalEEMod quantifies emissions associated with the use of off-road equipment, on-road worker commute, and construction delivery and haul trucks. Fugitive dust emissions are quantified for grading and site preparation activities/earthwork, truck loading, demolition, and vehicle trips on paved and unpaved surfaces. The program calculates fugitive dust associated with onsite earthwork, including onsite grading and site preparation phases, based on the construction equipment to be used (e.g., crawler tractors, graders, dozers, scrapers), hours of use, and the estimated area of disturbance calculated for each piece of equipment.

Operational Emissions. Operational emissions associated with on-site development were estimated using CalEEMod and vehicle trip data provided in the traffic study prepared by Hatch Mott MacDonald (Appendix I). Operational emissions would be comprised of mobile source emissions, emissions associated with energy consumption, and area source emissions. Mobile source emissions are generated by the increase in motor vehicle trips to and from the Project Site associated with operation of the project. Emissions attributed to energy use include electricity and natural gas consumption for space and water heating and cooling. Area source emissions are generated, for example, by landscape maintenance equipment, consumer products, and architectural coatings. Emissions from the existing conditions on the site and the emissions from the full build-out of the project were calculated in order to find the net change in operational emissions at the project location.

b. Project Impacts and Mitigation Measures.

Threshold 1:	*Conflict with or obstruct implementation of the applicable air quality plan.*

Impact AQ-1 The proposed project would introduce additional housing to the area and contribute to population growth. However, growth would be within the growth assumptions of the 2008 AQMP. This impact would be Class III, *less than significant.*

CEQA Guidelines §15125(b) requires that an EIR evaluate a project's consistency with applicable regional plans, in this instance the 2008 AQMP. The MBARD issues consistency determinations in order to assess the potential cumulative impacts of development on regional

air quality. Project emissions which are not consistent with the AQMP are not accommodated in the AQMP and would represent a potentially significant impact for the purposes of CEQA.

As noted in Section 4.2.2(a) (Methodology and Significance Thresholds), a project would conflict with or obstruct implementation of the AQMP if it is inconsistent with the growth assumptions included in the AQMP, in terms of population, employment, or regional growth in vehicle miles travelled (MBARD, 2008b, revised 2012). MBARD utilizes dwelling units to determine consistency with the AQMP, due to the close relationship with population and the ability to track housing stock. As required by MBARD, a Consistency Procedure was completed, which is included as Appendix C to this EIR.

The 2008 AQMP and 2012 AQMP Revision are based on the 2008 AMBAG and DOF forecast of 48,688 dwelling units for unincorporated Monterey County in 2035. Currently, the unincorporated portion of Monterey County has 38,874 dwelling units (California Department of Finance, 2016). Past, present, and reasonably foreseeable future projects in Carmel Valley, as shown in Table 3-1 in Section 3.0, *Environmental Setting*, would add an estimated 524 dwelling units to the Valley. The Consistency Procedure determined that the 31 residences proposed by the project and the 524 cumulative dwelling units would result in 39,398 dwelling units in the unincorporated portion of Monterey County, which is below the AMBAG dwelling unit projection used in development of the AQMP. Additionally, if all pending projects in Carmel Valley are approved and built, the additional 524 dwelling units would not increase the number of dwelling units in unincorporated Monterey County above projections used in the 2008 AQMP and 2012 AQMP Revision. Therefore, the project is consistent with the AQMP.

Mitigation Measures. No mitigation measures are required.

Significance After Mitigation. Impacts would be less than significant without mitigation.

Threshold 2:	*Violate any air quality standards or contribute substantially to an existing or projected air quality violation.*
Threshold 3:	*Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed qualitative thresholds for ozone precursors).*

Impact AQ-2 Construction of the proposed project would result in the temporary generation of air pollutants, which would affect local air quality. The emissions would be short term and no criteria pollutants would exceed MBARD thresholds. Impacts would be Class III, *less than significant.*

Construction emissions are generally referred to as temporary impacts of a project, but have the potential to represent a significant impact with respect to air quality. Fugitive particulate matter dust emissions are among the pollutants of greatest concern with respect to construction activities. These emissions from construction activities can lead to adverse health effects and

nuisance concerns, such as reduced visibility and soiling of exposed surfaces. General site grading operations are the primary sources of fugitive particulate matter dust emissions. However, these emissions can vary greatly, depending on the level of activity, the specific operations taking place, the number and types of equipment operated, vehicle speeds, local soil conditions, weather conditions, and the amount of earth disturbance (e.g., site grading, excavation, cut and fill).

Emissions of ozone precursors NO_X and ROG are primarily generated by the operation of off-road construction equipment and mobile sources (i.e., delivery vehicles, construction worker vehicles). Generation of these emissions vary as a function of the types and number of heavy-duty, off-road equipment used and the intensity and frequency of their operation, as well as vehicle trips per day associated with delivery of construction materials, the importing and exporting of soil, vendor trips, and worker commute trips.

The proposed project would involve demolition, site-preparation, grading, excavation, and paving to develop 31 residential units, including 24 market-rate single-family and seven inclusionary units. The use of equipment that is not "typical construction equipment" as specified in Section 5.3 of the MBARD *Guidelines* is not expected. The ozone precursors NO_X and ROG would be emitted by the operation of construction equipment, while PM_{10} would be emitted by activities that disturb the soil, such as grading and excavation.

Off-road equipment exhaust emissions, including from USEPA-defined non-road engines, were calculated based on emissions factors for individual pieces of construction equipment within CalEEMod and standard assumptions for the amount of construction equipment that would be operating during the construction phase. The results provide the total peak emissions that would occur if all construction equipment needed for the project would be operating on the same day for a total of eight hours. This is a conservative estimate; actual peak emissions would generally be lower, since it is unlikely that all construction equipment would operate simultaneously. Emissions would also be generated by construction employees traveling to and from the site, as well as trucks hauling materials to and from the site. According to MBARD, construction related emissions could result in adverse health risks to nearby sensitive receptors if emission thresholds are exceeded.

Construction of the proposed project would result in the temporary generation of vehicle and equipment exhaust and fugitive dust, over the course of project construction. In order to provide a reasonable worst case evaluation of daily construction emissions, this analysis assumed that all units on the project site would be developed concurrently. Construction emissions related to the proposed project are presented in Table 4.2-5.

Table 4.2-5
Project Construction Emissions

	ROG	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
2017 Maximum Daily Emissions	6.7	51.9	43.4	0.1	20.1	12.5
2018 Maximum Daily Emissions	13.5	23.6	18.9	<0.1	1.6	1.4
MBARD Threshold	137	137	550	150	82	N/A
Threshold Exceeded?	***No***	***No***	***No***	***No***	***No***	***No***

See CalEEMod Calculations, Appendix C

As shown in Table 4.2-5, temporary emissions during construction would not exceed MBARD thresholds for any criteria pollutant. Therefore, short-term air quality emissions during project construction would be less than significant.

Mitigation Measures. No mitigation measures are required.

Significance After Mitigation. Impacts would be less than significant without mitigation.

Impact AQ-3 Operational emissions would not exceed MBARD's daily thresholds. Impacts would be Class II, *less than significant.*

Long-term operational emissions associated with the proposed project are those attributed to vehicle trips (mobile emissions), the use of natural gas and electricity (energy source emissions), and consumer products, architectural coatings, and landscape maintenance equipment (area source emissions). CalEEMod was used to calculate emissions based on the proposed land uses for the project site and the number of trips generated.

Area Emissions. Area source emissions would be generated through landscape maintenance equipment, consumer products, and architectural coatings. In addition, area source emissions include emissions from wood and gas burning hearths/fireplaces. Based on default CalEEMod assumptions for single-family homes in Monterey County, this analysis estimates that wood burning fireplaces would be present in 35% of the single family homes and multi-family units, 55% would contain natural gas fireplaces, and 10% would not contain a fireplace. Area source emissions associated with landscaping equipment were calculated using CalEEMod defaults, based on the proposed land uses, an assumed number of days on which landscape equipment would be operated, and emissions factors for appropriate types of landscape equipment (CAPCOA, 2013b).

Mobile Emissions. Mobile source emissions are generated by the increase in motor vehicle trips to and from the project site associated operation of onsite development. The proposed project would introduce population growth of approximately 94 persons to the area, which would generate additional vehicle trips associated with residences. Based on the *Val Verde Subdivision Traffic Impact Analysis* (see Appendix I) the project would generate 285 net new daily trips, a rate of 9.52 trips per dwelling unit.

Energy Emissions. Emissions attributed to energy use include natural gas consumption for space and water heating. Electricity is generated offsite and would not have a localized impact at the project site.

Table 4.2-6 illustrates the long-term operational emissions from the proposed project. Existing emissions, project emissions, and net emissions are all included.

Table 4.2-6
Operational Emissions

	Estimated Emissions (lbs/day)					
	ROG	**NO_x**	**CO**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Existing						
Area	1.6	0.02	2.0	<0.01	0.3	0.3
Mobile	0.04	0.1	0.5	<0.01	0.1	0.02
Energy	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Existing	1.6	0.1	2.5	<0.01	0.4	0.3
Proposed Project						
Area	95.3	1.3	119.4	<0.1	16.4	16.4
Mobile	3.9	3.5	16.0	<0.1	1.8	0.5
Energy	<0.1	0.2	0.1	<0.1	<0.1	<0.1
Total Project	99.2	5.1	135.6	0.1	18.3	17.0
Net Change						
Existing Emissions	1.6	0.1	2.5	<0.01	0.4	0.3
Project Emissions	99.2	5.1	135.6	0.1	18.3	17.0
Net Change (Project-Existing)	*97.6*	*5.0*	*133.1*	*0.1*	*17.9*	*16.7*
MBARD Threshold	*137*	*137*	*550*	*150*	*82*	*N/A*
Threshold Exceeded?	***No***	***No***	***No***	***No***	***No***	***N/A***

See CalEEMod calculations, Appendix C

As shown in Table 4.2-6, operational emissions associated with the buildout of the proposed project would not exceed the applicable MBARD thresholds for any of the criteria pollutants. However, MBARD recommends that no wood burning fire places be installed as part of the project and that any fireplaces, stoves, or furnaces should operate with natural gas. MBARD also recommends the inclusion of an electric vehicle charging station, to be installed in a common area that is accessible to residents. Because the project would not exceed established thresholds, these recommendations are not required as mitigation.

Mitigation Measures. No mitigation would be required.

Significance After Mitigation. Impacts would be less than significant without mitigation.

Threshold 4: Expose sensitive receptors to substantial pollutant concentrations.

Impact AQ-4 The proposed project would not degrade service levels at study area intersections such that CO hotspots would be created. Impacts related to CO hotspots would be Class III, *less than significant.*

Areas with high vehicle density, such as congested intersections and parking garages, have the potential to create high concentrations of CO, known as CO "hot spots," which can expose sensitive receptors to substantial pollutant concentrations. Specifically, hot spots can be created at intersections where traffic levels are sufficiently high such that the local CO concentration exceeds the federal AAQS of 35.0 ppm or the state AAQS of 20.0 ppm.

According to the MBARD *CEQA Air Quality Guidelines* (2008a), a local CO hotspot analysis should be conducted if:

1. *Intersections or road segments that operate at LOS D or better would operate at LOS E or F with the project's traffic,*
2. *Intersections or road segments that operate at LOS E or F where the volume-to-capacity (V/C) ratio would increase 0.05 or more with the project's traffic,*
3. *Intersections that operate at LOS E or F where delay would increase by 10 seconds or more with the project's traffic,*
4. *Unsignalized intersections which operate at LOS E or F where the reserve capacity would decrease by 50 or more with the project's traffic,*
5. *The project would generate substantial heavy duty traffic or generate substantial traffic along urban street canyons or near a major stationary source of CO.*

The proposed project is a residential project that would not generate substantial heavy duty truck traffic or generate substantial traffic along urban street canyons or near major stationary sources of CO.

As shown in Table 4.14-2 in Section 4.14, *Transportation and Circulation*, no intersections in the study area currently operate at LOS E or F. As shown in Table 4.14-17, upon buildout of the project, no intersections that operate at LOS D or better would operate at LOS E or F with the addition of project traffic. Therefore, a CO hotspot analysis is not warranted for intersections.

As shown in Tables 4.14-2 through 4.14-4 in Section 4.14, *Transportation and Circulation*, six road segments operates under LOS E or F under Existing conditions:

- *Segment 3: Southbound and Northbound SR 1 from Carmel Valley Road to Rio Road;*
- *Segment 6: Carmel Valley Road from Robinson Canyon Road to Schulte Road;*
- *Segment 7: Carmel Valley Road from Schulte Road to Rancho San Carlos Road;*
- *Segment 11: Northbound Carmel Rancho Boulevard Carmel Valley Road to Shopping Center Driveway;*
- *Segment 13: Westbound Rio Road from Crossroads Boulevard to SR 1; and*
- *Segment 14: Westbound Rio Road from Carmel Center Place to Crossroads Boulevard.*

As detailed in Impact T-1 in Section 4.14, *Transportation and Circulation,* the project would add vehicle trips to these segments but would not further degrade existing LOS, nor increase the V/C ratio or delay substantially enough to warrant a CO hotspot analysis.

Mitigation Measures. No mitigation is required.

Significance After Mitigation. Impacts would be less than significant without mitigation.

Impact AQ-5 The project would not expose sensitive receptors to substantial pollutant concentrations associated with construction dust or toxic air contaminants. Impacts related to these localized pollutants would be Class III, *less than significant.*

Construction Dust. As described under Impact AQ-2, project construction emissions would not exceed MBARD daily thresholds. The nearest existing sensitive receptor is an existing residence located approximately 50 feet south of the project site. There is also an existing residence on the project site, which would be removed as a result of the project. For the purpose of this analysis, it is assumed this residence would be vacated prior to other site disturbance.

As discussed above, MBARD recommends evaluating potential impacts to sensitive receptors within 1,000 feet of a project site; however, as discussed in Impact AQ-2, the highest daily PM_{10} emissions associated with project construction would not exceed the MBARD's threshold of 82 pounds per day. This estimate for PM_{10} emissions does not include compliance with MBARD Rule 400 (Visible Emissions), Rule 425 (Use of Cutback Asphalt), and Rule 426 (Architectural Coatings), which would further reduce emissions of dust particulates and ROGs during construction activity. Therefore, the project would not have a significant impact on any sensitive receptors through an exposure to substantial pollutant concentrations relating to construction dust.

Short-Term Construction Toxic Air Contaminants. Exposure to localized concentrations of TACs was qualitatively assessed based on the project's potential to result in increased exposure of sensitive receptors to new or existing TAC emission sources. Construction emission estimates shown in Impact AQ-2 are based on a reasonable "worst-case" scenario and conservatively assume that all equipment would be running simultaneously during each phase. The health risk associated with high concentrations of diesel exhaust PM_{10} from construction equipment has a carcinogenic and chronic effect, but no short-term acute effect is currently recognized. The project could potentially expose sensitive receptors to temporary health hazards associated with TACs due to the operation of construction equipment. However, concentrations of mobile source diesel particulate matter (DPM) would only be present during temporary construction activities. PM_{10} emissions associated with construction activity would be well below the 82 pounds per day threshold established by the MBARD. Additionally, the lower density setting of the project site and lack of tall buildings to block air movement would allow emissions to disperse.

Operational Toxic Air Contaminants. DPM would be emitted from diesel-fueled vehicles generated by the proposed project during operation and by existing project-generated traffic adjacent to the project site. The particulate matter component of diesel exhaust has been classified as a TAC by CARB based on its potential to cause cancer and other adverse health effects. Urban roads with traffic volumes exceeding 100,000 vehicles per day or rural roads with volumes greater than 50,000 vehicles per day are potentially hazardous sources of TACs within 500 feet of a sensitive receptor. Roadways near the project site – including Carmel Valley Road, Rio Road, Carmel Rancho Boulevard, and Val Verde Drive- do not have traffic volumes that exceed these thresholds (Hatch Mott MacDonald, 2016) and Highway 1 is located approximately 1,370 feet west of the site. None of the stationary sources discussed in Section 4.2.1(d) are located in the vicinity of the project site. Therefore, the project site is not located near any major sources of TACs.

Mitigation Measures. No mitigation is required.

Significance After Mitigation. Impacts would be less than significant without mitigation.

Threshold 5:	*Create objectionable odors affecting a substantial number of people.*

Impact AQ-6 The proposed project would not create objectionable odors that would affect neighboring properties. Impacts related to odors would be Class III, *less than significant.*

Land uses typically producing objectionable odors include agricultural uses, wastewater treatment plants, food processing plants, chemical plants, composting, refineries, landfills, dairies, and fiberglass molding. The proposed project does not include any uses that would be associated with objectionable odors. Odor emissions from the project would be limited to odors associated with vehicle and engine exhaust and residential use, comparable with existing residential and commercial uses near the site.

During construction activities, only short-term, temporary odors from vehicle exhaust and construction equipment engines would occur. Construction-related odors would be short-term and would cease upon completion. The residence located approximately 50 feet south of the project site and other nearby residences would be temporarily exposed to odors from construction equipment exhaust and engines. As the project site is in a low density area without tall buildings to block air movement and hold odors, construction-related odors would disperse and dissipate and would not cause substantial odors at the closest sensitive receptors. Therefore, the project is not expected to result in significant impacts related to objectionable odors during construction or operation.

Mitigation Measures. No mitigation measures are required.

Significance After Mitigation. Impacts would be less than significant without mitigation.

c. Cumulative Impacts. The geographic scope for considering cumulative impacts to air quality is the NCCAAB. Air pollutants have impacts that are usually (though not always) cumulative by nature. Any new source of pollution may contribute with foreseeable future projects to violations of criteria pollutant standards if the existing background sources cause nonattainment conditions, as they do according to the state standards for ozone and particulate matter in the MBARD. Air districts manage attainment of the criteria pollutant standards by adopting rules, regulations, and attainment plans, which comprise a multifaceted programmatic approach to such attainment.

The proposed project would generate ROG and NO_x emissions, both precursors to O_3, throughout construction activities and through long-term operations. When high levels of ROG and NO_X are present, O_3 is able to be formed, however once the precursors decline, O_3 levels also decline. As shown in Tables 4.3-3 and 4.3-5 neither ROG nor NO_X emissions would exceed MBARD thresholds during construction or operations.

Emissions of PM_{10} would occur throughout construction and operations of the proposed project. These emissions, as shown in Tables 4.2-3 and 4.2-5, would not exceed MBARD thresholds during construction or operations.

The MBARD's approach to determining cumulative air quality impacts for criteria air pollutants is the same as for assessing individual project impacts. A project that does not exceed MBARD's construction or operational thresholds and is consistent with the 2008 AQMP and 2012 AQMP Revision would not have cumulatively considerable impacts on regional air quality (MBARD, 2008b). Since the proposed project emissions of $PM_{10,}$ ROG, and NO_x, would not exceed MBARD thresholds, and because the project would be consistent with the AQMP, cumulative impacts would be less than significant.

4.3 BIOLOGICAL RESOURCES

4.3.1 Summary

Table 4.3-1 summarizes the identified environmental impacts, proposed mitigation measures, and residual impacts of the proposed project with regard to biological resources. Additional detail is provided in Section 4.3.3 (Impact Analysis).

Table 4.3-1
Impact and Mitigation Summary: Biological Resources

Impact	Mitigation Measures	Residual Impact
Impact B-1 Implementation of the proposed project would impact special status animal species. Potential impacts to special status animal species are Class II, significant but mitigable.	**B-1(a) California Red-legged Frog (CRLF) Pre-construction Survey and Impact Avoidance.** The following measures shall be implemented during construction of the proposed project. • Water shall not be impounded in a manner that may attract CRLF. • All food-related garbage shall be placed in tightly sealed containers at the end of each workday to avoid attracting predators. Containers shall be emptied and garbage removed from the construction site at the end of each workweek. If sealed containers are not available, garbage shall be removed from the construction site upon completion of daily activities. All garbage removed from the construction site shall be disposed of at an appropriate off-site refuse location • Not less than 14 days prior to the start of any construction activities, including staging and mobilization, a qualified biologist shall conduct pre-construction surveys within suitable upland habitat on-site. If no CRLF are observed, no further mitigation is necessary. • Pets shall be prohibited at the construction site. **B-1(b) USFWS Consultation.** If CRLF, during any life stages, are identified within the work area and impacts to individuals cannot be avoided, construction and grading in these areas shall be halted, and the County and USFWS shall be contacted immediately to initiate FESA Consultation. No CRLF shall be captured and relocated without expressed permission from USFWS.	Implementation of Mitigation Measures B-1(a) through B-1(e) would reduce impacts to special status animals to a less than significant level.

Table 4.3-1
Impact and Mitigation Summary: Biological Resources

Impact	Mitigation Measures	Residual Impact
	B-1(c) Worker Environmental Awareness Training (WEAP). Prior to initiation of construction activities, including staging and mobilization, all personnel associated with project construction shall attend WEAP training, conducted by a qualified biologist, to aid workers in recognizing special status species and sensitive biological resources that may occur on-site. The program shall include identification of the special status species and their habitats, a description of the regulatory status and general ecological characteristics of sensitive resources, and review of the limits of construction and mitigation measures required to reduce impacts to biological resources within the work area. A fact sheet conveying this information shall also be prepared for distribution to all contractors, their employers, and other personnel involved with construction of the project. All employees shall sign a form documenting that they have attended the WEAP and understand the information presented to them. The form(s) shall be submitted to the implementing agency to document compliance. **B-1(d) Monterey dusky-footed Woodrat Pre-construction Survey and Impact Avoidance.** If feasible, vegetation removal shall be conducted when woodrats are least likely to breed in October through November. No more than 30 days prior to construction, a qualified biologist shall conduct a pre-construction survey for Monterey dusky-footed woodrat middens within 50 feet of the work limits. At the discretion of a qualified biologist, an exclusion buffer shall be established around any woodrat middens that can be avoided, and these exclusion zones shall be fenced as Environmentally Sensitive Areas to protect the nest. If a woodrat midden cannot be avoided, potential dismantling and relocation strategies shall be developed and presented to the CDFW by a qualified biologist for review and/or approval.	

Table 4.3-1
Impact and Mitigation Summary: Biological Resources

Impact	Mitigation Measures	Residual Impact
	B-1(e) White-tailed kite Survey and Impact Avoidance. Surveys for white-tailed kites shall be conducted by a qualified biologist no more than 14 days prior to initiation of any construction activities, including construction staging and vegetation removal. The surveys shall include the entire disturbance areas plus a 200-foot buffer around any disturbance areas. If no white-tailed kite active nests or roosts are observed, no further mitigation is necessary. If present, white-tailed kite active nest sites and roots shall be fully avoided. Full avoidance shall be documented by regular site visits by a qualified biologist. These site visits shall be documented in a report submitted to the County for verification that the project complies with full avoidance of nests or roosts. The monitoring and report documentation shall continue for the duration of the project or until the nests or roosts are no longer active. **B-1(f) Burrowing Owl Avoidance and Minimization.** Pre-construction surveys shall be conducted for burrowing owls in accordance with CDFW-adopted survey protocols (California Burrowing Owl Consortium, 1993). This could entail surveys for winter residents in December and January, in addition to peak nesting season (April 15 through July 15) surveys. All suitable habitat, potential or known burrows, or burrowing owls identified on-site shall be assessed and mapped. Survey results shall be valid only for the season during which the survey is conducted. Surveys shall cover all suitable habitats on-site plus a 500-foot buffer where feasible. If no burrowing owls or habitats are detected, no further action is required. If, during pre-construction surveys, burrowing owls are detected on-site or within the survey area, all burrowing owls and occupied burrows shall be counted, mapped as stated above, and avoided by establishing a buffer around the occupied burrow(s). The buffer shall be a minimum of 300 feet around	

Table 4.3-1
Impact and Mitigation Summary: Biological Resources

Impact	Mitigation Measures	Residual Impact
	nest burrows and 100 feet around non-nest burrows. Buffers shall be demarcated with highly visible construction fencing and no ground disturbance activities shall occur within this buffer until the qualified biologist has determined that the burrow is no longer occupied. If an occupied burrow cannot be avoided, passive relocation may be implemented by a qualified biologist with guidance from the CDFW. No burrowing owls may be trapped. Passive relocation shall be limited to the non-breeding season, typically between April 15 and July 15. Passive relocation may involve installation of one-way doors at burrow entrances for a minimum of five days. Once the qualified biologist has determined that the burrow is no longer occupied, the burrow may be hand excavated to prevent re-occupancy.	
Impact B-2 Construction of the proposed project could directly impact nesting raptors and other avian species protected under existing regulations by causing injury, death, or nest failure. Potential impacts to nesting birds are Class II, significant but mitigable.	**B-2 Pre-construction Surveys for Nesting Birds and Raptors**. For construction activities occurring during the nesting season (generally February 1 to September 15), surveys for nesting birds and raptors covered by the CFC and the MBTA (including, but not limited to special status species including the white-tailed kite) shall be conducted by a qualified biologist no more than 14 days prior to initiation of any construction activities, including construction staging and vegetation removal. The surveys shall include the entire disturbance areas plus a 200-foot buffer around any disturbance areas. If active nests are located, all construction work shall be conducted outside a buffer zone from the nest to be determined by the qualified biologist. The buffer shall be a minimum of 50 feet for non-raptor bird species and at least 150 feet for raptor species. Larger buffers may be required depending upon the status of the nest and the construction activities occurring in the vicinity of the nest. The biologist shall have full discretion for establishing a suitable buffer. The buffer area(s) shall be closed to all construction personnel and equipment until the adults and young are no longer reliant on the nest site.	Implementation of Mitigation Measure B-2 would reduce impacts to special status animals to a less than significant level.

Table 4.3-1
Impact and Mitigation Summary: Biological Resources

Impact	Mitigation Measures	Residual Impact
	A qualified biologist shall confirm that breeding/nesting is completed and young have fledged the nest prior to removal of the buffer.	
Impact B-3 Construction of the proposed project may require removal of one on-site redwood tree, which is protected under CVMP Policy CV-3.11 and Monterey County Code Section 21.64.260. Pursuant to receipt of a tree removal permit, the project would not conflict with either policy or ordinance. Therefore, potential impacts would be Class III, *less than significant*.	No mitigation is required.	Impacts would be less than significant.

4.3.2 Setting

a. Regional Setting. The project site is located in unincorporated Monterey County, within the Carmel Valley. The Carmel Valley is drained by the Carmel River, which originates in the Santa Lucia Mountains and flows into the Pacific Ocean. Common habitats within the Carmel Valley include oak and riparian woodlands, chaparral and shrublands, and grasslands. Natural habitats have been altered by development and agriculture, but intact corridors of habitats exist, with the Carmel River riparian corridor of particular note. .

b. Project Site Setting. The 7.9-acre Carmel Rio Road project site is located at 15 and 26500 Val Verde Drive (Figure 2-2). The project site is comprised of three parcels (Assessor's Parcel Numbers [APN] 015-021-020-000, 015-021-021-000, & 015-021-015-000) that are located in the *Carmel Valley* 7.5 minute U.S. Geological Survey quadrangle topographic map. The project site is located at the fringe of a primarily urban and residential landscape immediately to the north, south, and west. To the east, the project site is bordered by open space, Carmel Middle School, and the Rancho Canada Golf Club.

The project site's topography is essentially flat, and the site lies at an elevation of approximately 30 feet (9 meters). The Carmel River is located approximately 1,050 feet (0.2 mile) south of the site, and the site drains by sheet-flow toward the site's southwest corner. No aquatic habitats or natural communities occur within the project site. The project site is limited to agricultural fields, planted mixed woodland, and developed areas.

Vegetation Communities. This section addresses the habitats and vegetation communities at the project site. Vegetation community mapping is based on aerial imagery, a reconnaissance survey completed by Rincon Consultants, Inc. on February 5, 2016, and desktop review of available biological information. Vegetation classification was based on *A Manual of California Vegetation, Second Edition* (Sawyer et al., 2009) and *Preliminary Descriptions of the Terrestrial Communities of California* (Holland, 1986); but has been modified as needed to accurately describe the existing habitats observed on-site on February 5, 2016. As shown in Figure 4.3-1 and outlined in Table 4.3-2, the project site contains three vegetation communities, which are each discussed below. None of these vegetation communities are considered sensitive (CDFW, 2010).

Imagery provided by Google and its licensors © 2016.

Vegetation Communities Map

Figure 4.3-1

Table 4.3-2
Acreages of Vegetation Communities Found within the Project Site

Vegetation Community	Acres (approx.)[1]
Agricultural Field	5.91
Planted Mixed woodland	1.43
Developed	0.79

1. These figures sum to approximately 8.13 acres. Based on the County's parcel data, the project site is approximately 7.9 acres. This mapping discrepancy is the result of different data sets with varying levels of accuracy.

Agricultural Field. This community type is not naturally occurring, and therefore is not described in either the Holland (1986) or Sawyer et al. (2009) classification systems. The agriculture field community type covers approximately 5.91 acres, or approximately 73% of the project site.[1] Row crops on the site include strawberries, melons, artichokes, squash, pumpkins, fennel, fava beans, zucchini, radishes, and flowers.

Planted Mixed Woodland. Within the project site, this community consists of planted trees, and therefore is not described in either the Holland (1986) or Sawyer et al. (2009) classification systems. The vegetation type covers approximately 1.43 acres, or approximately 18% of the site, located in the southeastern corner. Tree species in this type include Monterey cypress (*Cupressus macrocarpa*), Monterey pine (*Pinus radiata*), coast redwood (*Sequoia sempervirens*), and box elder (*Acer negundo*). Associated shrubs include myoporum (*Myoporum laetum*) and holly-leafed cherry (*Prunus ilicifolia*).

Developed. This community type is not naturally occurring, and therefore is not described in either the Holland (1986) or Sawyer et al. (2009) classification systems. The habitat covers approximately 0.79 acres, or approximately 10% of the site, located in the southeastern corner. This habitat includes a single-family residence and associated garage. Vegetation in this area includes ornamental landscaping, ice plant (*Carpobrotus edulis*), and Cape ivy (*Delairea odorata*).

c. Drainages and Wetlands. The project site is located within the Carmel River watershed. The portion of the Carmel River approximately 1,050 feet south of the proposed project is a perennial drainage. Flows from the Carmel River ultimately drain into the Pacific Ocean. The Carmel River and its tributaries are of biological importance, and are utilized by species such as south-central California coast (S-CC) steelhead Distinct Population Segment (*Oncorhynchus mykiss*) and California red-legged frog (*Rana draytonii*). The Carmel River is classified as critical habitat for the Distinct Population Segment (DPS) of S-CCC steelhead (NMFS, 2007).

No potential jurisdictional wetlands or other non-wetland waters were identified on-site during the 2016 field reconnaissance survey or during field surveys conducted by Rana Creek Habitat Restoration (2007 and 2012). Therefore, no drainages or wetlands subject to U.S. Army Corps of Engineers (USACE) jurisdiction under the Clean Water Act, or which fall under California Department of Fish and Wildlife (CDFW) or regional Water Quality Control Board (RWQCB) jurisdiction occur within the project site.

[1]Percentage calculated using the acreages in Table 4.4-2.

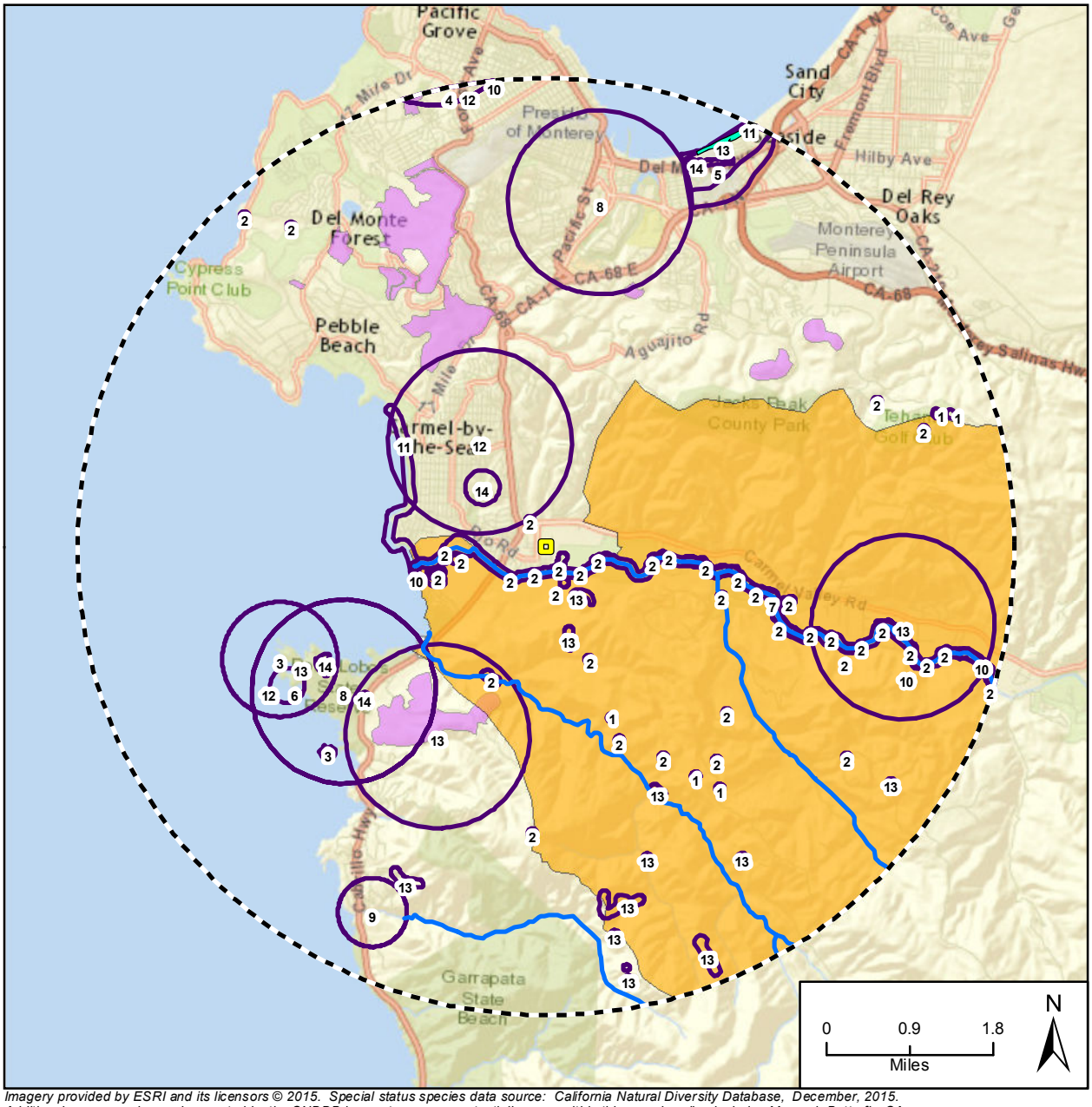
d. Special Status Species. For the purpose of this EIR, special status species are those plants and animals listed, proposed for listing, or candidates for listing as threatened or endangered by the U.S. Fish and Wildlife Service (USFWS) or National Marine Fisheries Service (NMFS) under the federal Endangered Species Act (ESA); those listed or proposed for listing as rare, threatened, or endangered by the CDFW under the California Endangered Species Act (CESA); animals designated as "Species of Special Concern," "Fully Protected," or "Watch List" by the CDFW; and plants with a California Rare Plant Rank (CRPR) of 1 or 2 which are defined as:

- CRPR 1A = Plants presumed extinct in California;
- CRPR 1B.1 = Rare or endangered in California and elsewhere; seriously endangered in California (over 80% of occurrences threatened/high degree and immediacy of threat);
- CRPR 1B.2 = Rare or endangered in California and elsewhere; fairly endangered in California (20-80% occurrences threatened);
- CRPR 1B.3 = Rare or endangered in California and elsewhere, not very endangered in California (<20% of occurrences threatened or no current threats known);
- CRPR 2A = Plants Presumed Extirpated in California, But Common Elsewhere;
- CRPR 2B = Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere

Queries of the USFWS Information, Planning, and Conservation System (IPaC) (USFWS, 2015), CDFW California Natural Diversity Database (CNDDB) (CDFW, 2015a), and California Native Plant Society (CNPS) Online Inventory of Rare, Threatened and Endangered Plants of California (CNPS, 2015) were conducted to obtain comprehensive information regarding special status species considered to have potential to occur within the project site.

Sensitive Communities and Critical Habitat. As shown in Figures 4.3-2a and 4.3-2b, the following natural communities considered sensitive by the CDFW as part of the Natural Heritage program and tracked in the CNDDB occur within five miles of the project site: Monterey pine forest, Monterey cypress forest, central dune scrub, central maritime chaparral, Monterey Pygmy cypress forest, and northern bishop pine forest (CDFW, 2015). Federally designated critical habitat for western snowy plover (*Charadrius alexandrinus nivosus*), California red-legged frog (*Rana draytonii*), and Yadon's piperia (*Piperia yadonii*) are mapped within five miles of the project site (USFWS, 2015b).

Special Status Plants and Animals. Queries of the USFWS IPaC (2015b), CDFW CNDDB (2016), and CNPS Online Inventory of Rare, Threatened and Endangered Plants of California (2016) were conducted to obtain comprehensive information regarding special status species considered to have potential to occur on the project site or the vicinity, which is defined to be the area otherwise within the Monterey, California, United States Geological Survey (USGS) 7.5-minute topographic quadrangle and the surrounding four quadrangles of Marina, Seaside, Soberanes Point, and Mt. Carmel. The CNDDB records within a five-mile radius of the project site were reviewed and are shown in Figure 4.3-3. Thirty-eight special status plant species, two special status lichens, and 12 special status animal species are documented by the CNDDB within five miles of the project site. One CNDDB record for Monterey pine (*Pinus radiata*) overlaps with the project site and shows the estimated historical location of natural Monterey pine stands. No Monterey pine stands currently occur within the project site. Where applicable, the potential for a species to occur in adjacent off-site Carmel River, within 1,050 feet of the



Imagery provided by ESRI and its licensors © 2015. Special status species data source: California Natural Diversity Database, December, 2015. Additional suppressed records reported by the CNDDB known to occur or potentially occur within this search radius include: Monarch Butterfly, CA overwintering population, and Black Legless Lizard. For more information please contact the Department of Fish and Game. Critical habitat data source: U.S. Fish and Wildlife Service, November, 2015. Final critical habitat acquired via the USFWS Critical Habitat Portal. It is only a general representation of the data and does not include all designated critical habitat. Contact USFWS for more specific data.

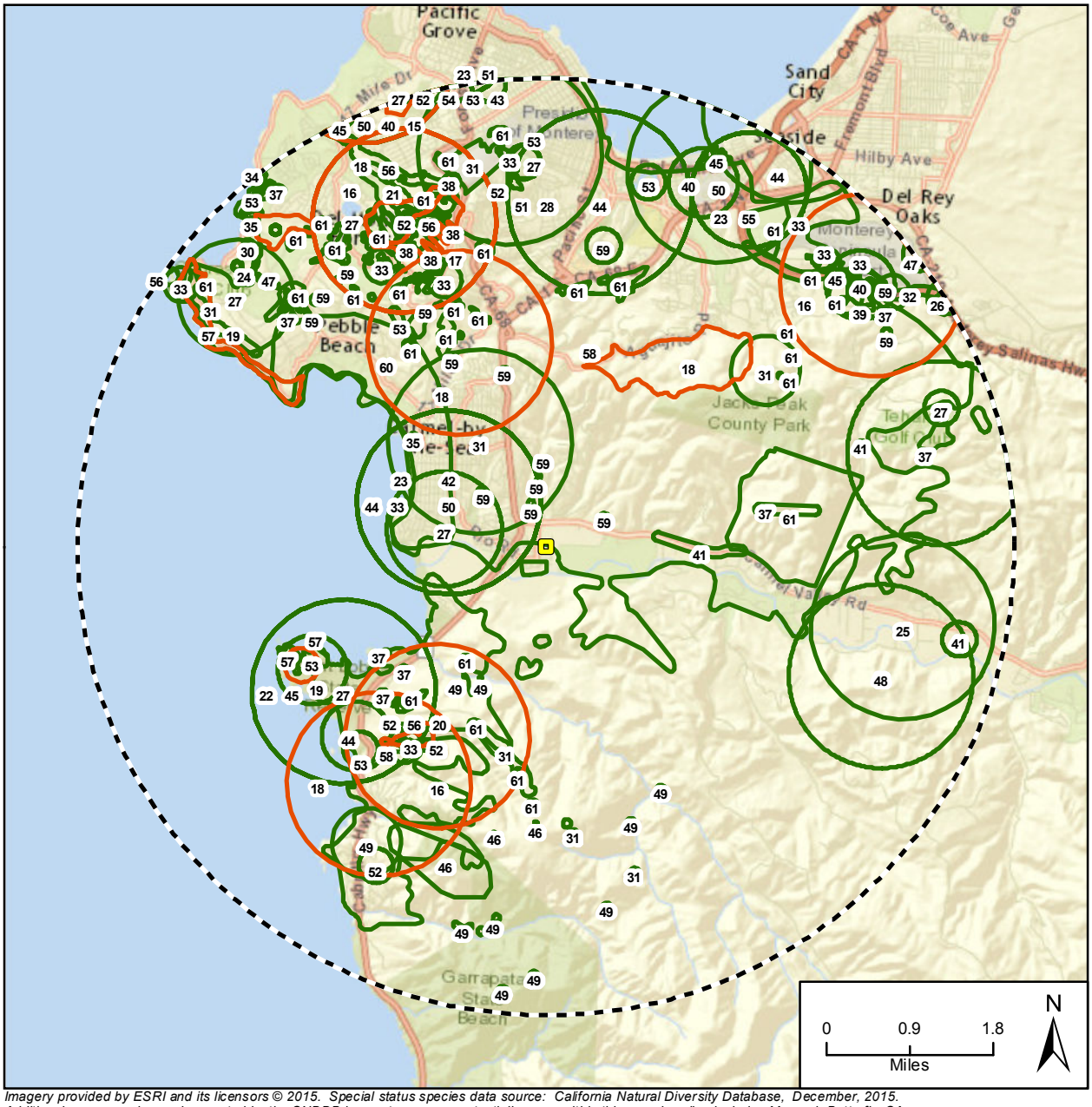
Project Location
5-Mile Buffer
Animals

Final Critical Habitat
Steelhead
California red-legged frog
Western snowy plover
Yadon's piperia

1 - California tiger salamander
2 - California red-legged frog
3 - California brown pelican
4 - western snowy plover
5 - burrowing owl
6 - black swift
7 - steelhead - south-central California coast DPS
8 - hoary bat
9 - Townsend's big-eared bat
10 - western pond turtle
11 - globose dune beetle
12 - obscure bumble bee
13 - Smith's blue butterfly
14 - monarch - California overwintering population

Sensitive Animals Reported in the California Natural Diversity Database and Federally Designated Critical Habitat

Figure 4.3-2a



Imagery provided by ESRI and its licensors © 2015. Special status species data source: California Natural Diversity Database, December, 2015. Additional suppressed records reported by the CNDDB known to occur or potentially occur within this search radius include: Monarch Butterfly, CA overwintering population, and Black Legless Lizard. For more information please contact the Department of Fish and Game. Critical habitat data source: U.S. Fish and Wildlife Service, November, 2015. Final critical habitat acquired via the USFWS Critical Habitat Portal. It is only a general representation of the data and does not include all designated critical habitat. Contact USFWS for more specific data.

- Project Location
- 5-Mile Buffer
- Natural Communities
- Plants

15 - Central Dune Scrub
16 - Central Maritime Chaparral
17 - Northern Bishop Pine Forest
18 - Monterey Pine Forest
19 - Monterey Cypress Forest
20 - Monterey Pygmy Cypress Forest
21 - angel's hair lichen
22 - twisted horsehair lichen
23 - Eastwood's goldenbush
24 - beach layia
25 - Carmel Valley malacothrix
26 - Santa Cruz microseris
27 - marsh microseris
28 - woodland woollythreads
29 - sand-loving wallflower
30 - Menzies' wallflower
31 - Hooker's manzanita
32 - Toro manzanita
33 - sandmat manzanita
34 - coastal dunes milk-vetch
35 - Tidestrom's lupine
36 - saline clover
37 - Pacific Grove clover
38 - Monterey clover
39 - Santa Cruz clover
40 - northern curly-leaved monardella
41 - Carmel Valley bush-mallow
42 - Santa Lucia bush-mallow
43 - maple-leaved checkerbloom
44 - Jolon clarkia
45 - Monterey spineflower
46 - Pinnacles buckwheat
47 - Monterey gilia
48 - Hospital Canyon larkspur
49 - Hutchinson's larkspur
50 - Kellogg's horkelia
51 - Hickman's cinquefoil
52 - pine rose
53 - pink Johnny-nip
54 - San Francisco collinsia
55 - seaside bird's-beak
56 - Gowen cypress
57 - Monterey cypress
58 - Monterey pine
59 - Hickman's onion
60 - fragrant fritillary
61 - Yadon's rein orchid

Sensitive Natural Communities and Plants Reported in the California Natural Diversity Database

Figure 4.3-2b

property line, is also included under Table 4.3-3 for the purpose of evaluating indirect off-site impacts.

Wildlife Movement Corridors. Wildlife movement corridors, or habitat linkages, are generally defined as connections between habitat patches that allow for physical and genetic exchange between otherwise isolated animal populations. Such linkages may serve a local purpose, such as providing a linkage between foraging and denning areas, or they may be regional in nature. Some habitat linkages may serve as migration corridors, wherein animals periodically move away from an area and then subsequently return. Other corridors may be important as dispersal corridors for young animals. A group of habitat linkages in an area can form a wildlife corridor network.

Habitats within a habitat linkage do not necessarily need to be identical to those habitats being linked. Rather, the linkage needs only to contain sufficient cover and forage to allow temporary utilization by species moving between core habitat areas. Habitat linkages are typically contiguous strips of natural areas, though dense plantings of landscape vegetation can be used by certain disturbance-tolerant species. Some species may require specific physical resources, such as rock outcroppings, vernal pools, or oak trees, within the habitat link for the linkage to serve as an effective movement corridor, while other more mobile or aerial species may only require discontinuous patches of suitable habitat to permit effective dispersal and/or migration. Wildlife movement corridors may occur at either large or small scales. The mountainous regions of the County may support wildlife movement on a regional scale, while riparian corridors and waterways may provide local small-scale dispersal corridors for wildlife movement among habitat patches throughout the County.

Table 4.3-3
Special Status Species Known or with Potential to Occur Within the Project Site or Vicinity

Scientific Name Common Name	Status* Fed/State ESAs Global/State Rank CRPR or CDFW	Habitat Requirements/Blooming Period	Potential for Occurrence within the Project Site or Vicinity
Lichens			
Bryoria spiralifera twisted horsehair lichen	--/-- G3/S1S2 1B.1	North coast coniferous forest. Usually on confers. Elevations: 0-98 feet.	**Not Expected to Occur.** Suitable habitat is not present on the project site.
Ramalina thrausta angel's hair lichen	--/-- G5/S2? 2B.1	North coast coniferous forest on dead twigs and other lichens. Elevations: 246-1,411 feet.	**Not Expected to Occur.** Suitable habitat is not present on the project site.
Plants			
Allium hickmanii Hickman's onion	--/-- G2/S2 1B.2	Closed-cone coniferous forest, chaparral, coastal scrub, valley and foothill grassland, and cismontane woodland. Sandy loam, damp ground and vernal swales; mostly in grassland though can be associated with chaparral or woodland. Elevations: 20-2000 feet. Blooms March-May.	**Not Expected to Occur.** Suitable habitat is not present on the project site. The mixed woodland on the site has been historically disturbed and supports planted trees and shrubs.
Arctostaphylos hookeri ssp. *hookeri* Hooker's manzanita	--/-- G3T2/S2 1B.2	Chaparral, coastal scrub, closed-cone coniferous forest, and cismontane woodland. Sandy soils, sandy shales, and sandstone outcrops. Elevations: 280-1000 feet. Blooms January – June.	**Not Expected to Occur.** Suitable habitat is not present on the project site. No *Arctostaphylos* species observed during site visit. The mixed woodland on the site has been historically disturbed and supports planted trees and shrubs.
Arctostaphylos montereyensis Toro manzanita	--/-- G3T2/S2 1B.2	Chaparral, cismontane woodland, coastal and scrub. Sandy soil, usually with chaparral associates. Elevations: 100-2400 feet. Blooms February – March.	**Not Expected to Occur.** Suitable habitat is not present on the project site. No *Arctostaphylos* species observed during site visit. The mixed woodland on the site has been historically disturbed and supports planted trees and shrubs.
Arctostaphylos pumila sandmat manzanita	--/-- G1/S1 1B.2	Closed-cone coniferous forest, chaparral, cismontane woodland, coastal dunes, and coastal scrub. On sandy soil with other chaparral associates. Elevations: 100-675 feet. Blooms February – May.	**Not Expected to Occur.** Suitable habitat is not present on the project site. No *Arctostaphylos* species observed during site visit. The mixed woodland on the site has been historically disturbed and supports planted trees and shrubs.
Astragalus tener var. *titi* Alkali milk-vetch	FE/SE G2T1/S1 1B.1	Coastal bluff scrub and coastal dunes. Moist, sandy depressions of bluffs or dunes along and near the Pacific Ocean; one site on a clay terrace. Elevations: 3-165 feet. Blooms March – June.	**Not Expected to Occur.** Suitable habitat is not present on the project site.

Table 4.3-3
Special Status Species Known or with Potential to Occur Within the Project Site or Vicinity

Scientific Name Common Name	Status* Fed/State ESAs Global/State Rank CRPR or CDFW	Habitat Requirements/Blooming Period	Potential for Occurrence within the Project Site or Vicinity
Castilleja ambigua var. *insalutata* Pink creamsacs	--/-- G4T2/S2 1B.1	Coastal bluff scrub and coastal prairie. Elevations: 0-330 feet. Blooms May – August.	**Not Expected to Occur.** Suitable habitat is not present on the project site.
Chorizanthe pungens var. *pungens* Monterey spineflower	FT/-- G2T2/S2 1B.2	Coastal dunes, chaparral, cismontane woodland, and coastal scrub. Sandy soils in coastal dunes or more inland within chaparral or other habitats. Elevations: 0-500 feet. Blooms April – August.	**Not Expected to Occur.** Suitable habitat is not present on the project site. The mixed woodland on the site has been historically disturbed and supports planted trees and shrubs.
Clarkia jolonensis Jolon clarkia	--/-- G2/S2 1B.2	Cismontane woodland. Elevation: 1650 feet. Blooms April – June.	**Not Expected to Occur.** Suitable habitat is not present on the project site. The mixed woodland on the site has been historically disturbed and supports planted trees and shrubs.
Collinsia multicolor San Francisco collinsia	--/-- G2/S2 1B.2	Closed-cone coniferous forest and coastal scrub. Sometimes serpentine substrates. On decomposed shale (mudstone) mixed with humus. Elevations: 100-820 feet. Blooms February – May.	**Not Expected to Occur.** Suitable habitat is not present on the project site.
Cordylanthus rigidus ssp. *littoralis* seaside bird's-beak	--/SE G5T2/S2 1B.1	Closed-cone coniferous forest, chaparral, cismontane woodland, coastal scrub, and coastal dunes. Sandy, often disturbed sites. Elevations: 0-705 feet. Blooms April – October.	**Not Expected to Occur.** Suitable habitat is not present on the project site. The mixed woodland on the site has been historically disturbed and supports planted trees and shrubs.
Delphinium californicum ssp. *interius* Hospital Canyon larkspur	--/-- G3T3/S3 1B.2	Cismontane woodland, chaparral. In wet, boggy meadows, openings in chaparral and in canyons. Elevations: 740-3500 feet. Blooms April – June.	**Not Expected to Occur.** Suitable habitat and mesic microhabitat is not present on the project site. Woodlands on the site have been historically disturbed and supported planted trees The project site is outside the elevation range of the species.
Delphinium hutchinsoniae Hutchinson's larkspur	--/-- G2/S2 1B.2	Broadleafed upland forest, chaparral, coastal prairie, and coastal scrub. On semi-shaded, slightly moist slopes, usually west-facing. Elevations: 0-1200 feet. Blooms March – June.	**Not Expected to Occur.** Suitable habitat is not present on the project site.
Ericameria fasciculata Eastwood's goldenbush	--/-- G2/S2 1B.1	Closed-cone coniferous forest, chaparral (maritime), coastal scrub, and coastal dunes. In sandy openings. Elevations: 100-900 feet. Blooms July – October.	**Not Expected to Occur.** Suitable habitat is not present on the project site.

Table 4.3-3
Special Status Species Known or with Potential to Occur Within the Project Site or Vicinity

Scientific Name Common Name	Status* Fed/State ESAs Global/State Rank CRPR or CDFW	Habitat Requirements/Blooming Period	Potential for Occurrence within the Project Site or Vicinity
Eriogonum nortonii Pinnacles buckwheat	--/-- G2/S2.3 1B.3	Chaparral and valley and foothill grassland. Sandy soils; often on recent burns; western Santa Lucias. Elevations: 1280-3200 feet. Blooms April – September.	**Not Expected to Occur.** Suitable habitat is not present on the project site. The project site is outside the elevation range of the species.
Erysimum ammophilum sand-loving wallflower	--/-- G2/S2 1B.2	Chaparral (maritime), coastal dunes, and coastal scrub. Sandy openings. Elevations: 0-425 feet. Blooms February – June.	**Not Expected to Occur.** Suitable habitat is not present on the project site.
Erysimum menziesii Menzies' wallflower	FE/SE G1/S1 1B.1	Coastal dunes. Localized on dunes and coastal strand. Elevations: 0-445 feet. Blooms March – September.	**Not Expected to Occur.** Suitable habitat is not present on the project site.
Fritillaria liliacea fragrant fritillaria	--/-- G2/S2 1B.2	Coastal scrub, valley and foothill grassland, and coastal prairie. Often on serpentine; various soils reported though usually clay, in grassland. Elevations: 10-1345 feet. Blooms February – April.	**Not Expected to Occur.** Suitable habitat is not present on the project site.
Gilia tenuiflora ssp. *arenaria* Monterey gilia	FE/ST G3G4T2/S2 1B.2	Coastal dunes, coastal scrub, chaparral (maritime), and cismontane woodland. Bare, wind-sheltered areas often near dune summit or in the hind dunes; two records from Pleistocene inland dunes. Elevations: 0-150 feet. Blooms April – June.	**Not Expected to Occur.** Suitable habitat is not present on the project site.
Hesperocyparis goveniana Gowen cypress	FT/-- G1/S1 1B.2	Closed-cone coniferous forest and chaparral. Coastal terraces; usually in sandy soils; sometimes with Monterey pine and bishop pine. Elevations: 100-985 feet.	**Not Expected to Occur.** Suitable habitat is not present on the project site.
Hesperocyparis macrocarpa Monterey cypress	--/-- G1/S1 1B.2	Closed-cone coniferous forest. Granitic soils. Elevations: 33-100 feet.	**Not Expected to Occur.** This species is present on the project site, but it is most likely planted and not within the species natural distribution.
Horkelia cuneata var. *sericea* Kellogg's horkelia	--/-- G4T2/S2? 1B.1	Closed-cone coniferous forest, coastal scrub, coastal dunes, and chaparral. Old dunes, coastal sandhills; openings. Elevations: 33-660 feet. Blooms April – September.	**Not Expected to Occur.** Suitable habitat is not present on the project site.

Table 4.3-3
Special Status Species Known or with Potential to Occur Within the Project Site or Vicinity

Scientific Name Common Name	Status* Fed/State ESAs Global/State Rank CRPR or CDFW	Habitat Requirements/Blooming Period	Potential for Occurrence within the Project Site or Vicinity
Layia carnosa beach layia	FE/SE G2/S2 1B.1	Coastal dunes and coastal scrub. On sparsely vegetated, semi-stabilized dunes, usually behind foredunes. Elevations: 0-200 feet. Blooms March – July.	**Not Expected to Occur.** Suitable habitat is not present on the project site.
Lupinus tidestromii Tidestrom's lupine	FE/SE 1B.1 G1/S1	Perennial rhizomatous herb. Blooms Apr-Jun. Coastal dunes. Partially stabilized dunes, immediately near the ocean. 0-100m (0-330ft).	**Not Expected to Occur.** Suitable dune habitat, appropriate soils, and associated native vegetation are not present.
Malacothamnus palmeri var. *involucratus* Carmel Valley bush-mallow	--/-- G3T3Q/S3 1B.2	Cismontane woodland and chaparral. Talus hilltops and slopes, sometimes on serpentine. Burn dependent. Elevations: 100-3600 feet. Blooms April – October.	**Not Expected to Occur.** Suitable habitat is not present on the project site.
Malacothrix saxatilis var. *arachnoidea* Carmel Valley malacothrix	--/-- G5T2/S2 1B.2	Chaparral and coastal scrub. Rock outcrops or steep rocky roadcuts. Elevations: 80-3400 feet. Blooms March – December.	**Not Expected to Occur.** Suitable habitat is not present on the project site.
Microseris paludosa marsh microseris	--/-- G2/S2 1B.2	Closed-cone coniferous forest, cismontane woodland, coastal scrub and valley and foothill grassland. Elevations: 16-1165 feet. Blooms April – July.	**Not Expected to Occur.** Suitable habitat is not present on the project site. The mixed woodland on the site has been historically disturbed and supports planted trees and shrubs.
Monardella sinuata ssp. *nigrescens* northern curly-leaved monardella	--/-- G3T2/S2 1B.2	Chaparral, coastal dunes, coastal scrub, and lower montane coniferous forest. Sandy soils. Elevations: 0-984. Blooms April – September.	**Not Expected to Occur.** Suitable habitat is not present on the project site.
Monolopia gracilens woodland woollythread	--/-- G3/S3 1B.2	Chaparral, valley and foothill grasslands (serpentine), cismontane woodland, broadleafed upland forests, and north coast coniferous forest. In openings with grasses. Sandy to rocky soils. Often seen on serpentine after burns. Elevations: 328-3,937. Blooms February – July.	**Not Expected to Occur.** Suitable habitat is not present on the project site. The mixed woodland on the site has been historically disturbed and supports planted trees and shrubs.
Pinus radiata Monterey pine	--/-- G1/S1 1B.1	Closed-cone coniferous forest and cismontane woodland. Three primary stands are native to California. Dry bluffs and slopes. Elevations: 80-600 feet.	**Not Expected to Occur.** This species is present on the project site, but it is most likely planted and not within the species natural distribution.

Table 4.3-3
Special Status Species Known or with Potential to Occur Within the Project Site or Vicinity

Scientific Name Common Name	Status* Fed/State ESAs Global/State Rank CRPR or CDFW	Habitat Requirements/Blooming Period	Potential for Occurrence within the Project Site or Vicinity
Piperia yadonii Yadon's rein orchid	FE/-- G2/S2 1B.1	Closed-cone coniferous forest, chaparral, and coastal bluff scrub. On sandstone and sandy soil, but poorly drained and often dry. Elevations: 33-1700 feet. Blooms February – August.	**Not Expected to Occur.** Suitable habitat is not present on the project site.
Potentilla hickmanii Hickman's cinquefoil	FE/-- G1/S1 1B.1	Freshwater marshes, seeps, and small streams in open or forested areas along the coast within coastal bluff scrub, closed-cone coniferous forest, and meadows. Elevations: 33-500 feet. Blooms April – August.	**Not Expected to Occur.** Suitable habitat is not present on the project site.
Rosa pinetorum pine rose	--/-- G2Q/S2 1B.2	Closed-cone coniferous forest. Elevations: 7-100 feet. Blooms May – July.	**Not Expected to Occur.** Suitable habitat is not present on the project site.
Sidalcea malachroides maple-leaved checkerbloom	--/-- G3/S3 4.2	Broadleafed upland forest, coastal prairie, coastal scrub, and north coast coniferous forest in clearings near coast; often in disturbed areas. Elevations: 7-2500 feet. Blooms March – August.	**Not Expected to Occur.** Suitable habitat is not present on the project site.
Stebbinsoseris decipiens Santa Cruz microseris	--/-- G2/S2 1B.2	Broadleafed upland forest, closed-cone coniferous forest, chaparral, coastal prairie, and coastal scrub. Open areas in loose or disturbed soil, usually derived from sandstone, shale or serpentine, on seaward slopes. Elevations: 33-1640 feet. Blooms April – May.	**Not Expected to Occur.** Suitable habitat is not present on the project site.
Trifolium buckwestiorum Santa Cruz clover	--/-- G2/S2 1B.1	Coastal prairie, broadleafed upland forest, and cismontane woodland in moist grasslands at gravelly margins. Elevations: 345-2000 feet. Blooms April – October.	**Not Expected To Occur.** No suitable habitat for this species occurs within the project site.
Trifolium hydrophilum saline clover	--/-- G2/S2 1B.2	Alkaline soils in marshes, mesic valley and foothill grassland, and vernal pools. Elevations: 0-984. Blooms April – June.	**Not Expected To Occur.** No suitable habitat for this species occurs within the project site.

Table 4.3-3
Special Status Species Known or with Potential to Occur Within the Project Site or Vicinity

Scientific Name Common Name	Status* Fed/State ESAs Global/State Rank CRPR or CDFW	Habitat Requirements/Blooming Period	Potential for Occurrence within the Project Site or Vicinity
Trifolium polyodon Pacific Grove clover	-- /SR 1B.1 G1 / S1	Annual herb. Blooms April-Jul. Closed-cone coniferous forest, meadows and seeps, coastal prairie, valley and foothill grassland. Along small springs and seeps in grassy openings. 5-120m (15-395ft).	**Not Expected To Occur.** Suitable habitats are not present. No seeps, springs, closed-cone forest, or grasslands are present.
Trifolium trichocalyx Monterey clover	FE/SE 1B.1 G1 / S1	Annual herb. Blooms Apr-Jun. Closed-cone coniferous forest. Poorly drained, low nutrient soil underlain with hardpan; also openings and burned areas. 30-240m (100-790ft).	**Not Expected To Occur.** The site does not support closed cone forest, and lacks openings and burned areas with suitable poorly drained, low nutrient soils underlain by hardpan are not present.
Invertebrates			
Danaus plexippus Monarch butterfly	--/-- G4T2T3/S2S3 --	Roosts located in wind-protected tree groves (eucalyptus, Monterey pine, Monterey cypress), with nectar and water sources nearby. Winter roost sites extend along the coast from northern Mendocino to Baja California, Mexico.	**Not Expected To Occur.** No suitable habitat for this species occurs within the project site.
Euphilotes enoptes smithi Smith's blue butterfly	FE/-- G5T1T2 /S1S2 ---	Most commonly associated with coastal dunes and coastal sage scrub plant communities in Monterey and Santa Cruz counties. Hostplant: *Eriogonum latifolium* and *Eriogonum parvifolium* are utilized as both larval and adult food plants.	**Not Expected To Occur**. No suitable habitat for this species occurs within the project site.
Fish			
Oncorhynchus mykiss irideus Steelhead – South/Central California Coast DPS	FT/-- G5T2Q/S2 SSC	Occurs in fresh water, fast flowing, highly oxygenated, clear, cool streams where riffles tend to predominate pools; small streams with high elevation headwaters close to the ocean that have no impassible barriers; spawning and high elevation headwaters. Federal listing refers to runs in coastal basins from the Pajaro River south to, but not including, the Santa Maria River.	**Not Expected To Occur Within the Project Site, But May Occur Within the Vicinity.** No suitable habitat for this species occurs within the project site. However, steelhead are known to spawn in the Carmel River. The Carmel River is approximately 1,050 feet south of the project site. The Carmel River is considered south/central California coast steelhead Federally Designated Critical Habitat.

Table 4.3-3
Special Status Species Known or with Potential to Occur Within the Project Site or Vicinity

Scientific Name Common Name	Status* Fed/State ESAs Global/State Rank CRPR or CDFW	Habitat Requirements/Blooming Period	Potential for Occurrence within the Project Site or Vicinity
Amphibians			
Ambystoma californiense California tiger salamander	FT/ST G2G3/S2S3 SSC	Central Valley DPS federally listed as threatened. Santa Barbara & Sonoma counties DPS federally listed as endangered. Need underground refuges, especially ground squirrel burrows, and vernal pools or other seasonal water sources for breeding.	**Not Expected To Occur.** No suitable habitat for this species occurs within the project site.
Rana draytonii California red-legged frog	FT/-- G2G3/S2S3 SSC	Lowlands and foothills in semi-permanent or permanent water at least 2 feet deep, with dense emergent or riparian vegetation. Requires 11-20 weeks of permanent water for larval development. Must have access to estivation habitat in upland grasslands, forest, or scrub.	**May Occur.** No suitable aquatic breeding habitat occurs within the project site, however the project site could provide suitable upland dispersal habitat. There are numerous CNDDB records on the Carmel River, which is approximately 1,050 feet south of the project site.
Reptiles			
Actinemys marmorata Western pond turtle	--/-- G3G4/S3 SSC	A thoroughly aquatic turtle of ponds, marshes, rivers, streams, and irrigation ditches, usually with aquatic vegetation. Needs basking sites and suitable (sandy banks or grassy open fields) upland habitat up to 1640 feet from water for egg-laying.	**Not Expected To Occur.** No suitable habitat for this species occurs within the project site.
Anniella pulchra nigra black legless lizard	--/-- G3G4T2T3Q /S2 SSC	Sand dunes and sandy soils in the Monterey Bay and Morro Bay regions. Inhabit sandy soil/dune areas with bush lupine and mock heather as dominant plants. Moist soil is essential.	**Not Expected To Occur.** No suitable habitat for this species occurs within the project site.

Table 4.3-3
Special Status Species Known or with Potential to Occur Within the Project Site or Vicinity

Scientific Name Common Name	Status* Fed/State ESAs Global/State Rank CRPR or CDFW	Habitat Requirements/Blooming Period	Potential for Occurrence within the Project Site or Vicinity
Birds			
Athene cunicularia Burrowing owl	--/-- G4/S3 SSC	Burrow sites in open dry annual or perennial grasslands, deserts and scrublands characterized by low growing vegetation. Subterranean nester, dependent upon burrowing mammals, most notably, the California ground squirrel. Also inhabits anthropogenic habitats such as campuses, golf courses, cemeteries, airports, and grazed pastures.	**May Occur.** Marginally suitable habitat for this species occurs within the project site.
Charadrius alexandrinus nivosus western snowy plover	FT/-- G3T3/S2 SSC	Sandy beaches, salt pond levees and shores of large alkali lakes. Needs sandy, gravelly or friable soils for nesting.	**Not Expected To Occur.** No suitable habitat for this species occurs within the project site.
Cypseloides niger black swift	--/-- G4/S2 SSC	Coastal belt of Santa Cruz and Monterey Counties, central and southern Sierra Nevada; San Bernardino and San Jacinto Mountains. Breeds in small colonies on cliffs behind or adjacent to waterfalls in deep canyons and sea-bluffs above the surf.	**Not Expected To Occur.** No suitable habitat for this species occurs within the project site.
Elanus leucurus White-tailed kite	--/-- G5/S3S4 FP	Occurs throughout most of California's coastal and valley regions excluding the Cascade, Sierra Nevada, Mojave Desert, and Peninsular Ranges. Grasslands, dry farmed agricultural fields, savannahs and relatively open oak woodlands, and other relatively open lowland scrublands. Isolated, dense-topped trees for nesting and perching.	**May Occur Within the Project Site and Observed Within the Vicinity.** Observed foraging adjacent to the project site in 2007 (Rana Creek, 2007). Trees that potentially provide breeding habitat and agricultural foraging habitat exists throughout the project site and in the vicinity. Nesting habitat also occurs adjacent to the site in the Carmel River riparian woodlands.
Pelecanus occidentalis californicus California brown pelican	FD/-- G4T3/S3 FP	Colonial nester on coastal islands just outside the surf line. Nests on coastal islands of small to moderate size which afford immunity from attack by ground-dwelling predators. Roosts communally.	**Not Expected To Occur.** No suitable habitat for this species occurs within the project site.

Table 4.3-3
Special Status Species Known or with Potential to Occur Within the Project Site or Vicinity

Scientific Name Common Name	Status* Fed/State ESAs Global/State Rank CRPR or CDFW	Habitat Requirements/Blooming Period	Potential for Occurrence within the Project Site or Vicinity
Mammals			
Corynorhinus townsendii Townsend's big-eared bat	--/CT G3G4/S2 SSC	Throughout California in a wide variety of habitats. Most common in mesic sites. Roosts in the open, hanging from walls and ceilings. Roosting sites limiting. extremely sensitive to human disturbance	**Not Expected To Occur.** No suitable habitat for this species occurs within the project site
Neotoma macrotis luciana [*Neotoma fuscipes luciana*] Monterey dusky-footed woodrat	--/-- G5T3/S3 SSC	Broadleaved upland forest and woodlands of moderate canopy and moderate to dense understory and chaparral. Nests constructed of grass, leaves, sticks, feathers, etc. Population may be limited by availability of nest materials.	**Present.** Multiple nests were observed on-site on APN 015-021-020 during the 2007 and 2012 reconnaissance surveys (Rana Creek, 2007; Rana Creek, 2012).

**Status Definitions:*
FE = Federally Endangered *FT = Federally Threatened* *FD = Federally Delisted* *SE = State Endangered*
ST = State Threatened *SR = State Rare* *SA = Special Animal* *FP = Fully Protected*
SSC = Species of Special Concern *G-Rank/S-Rank = Global Rank and State Rank as per NatureServe and CDFW's CNDDB.*

CRPR (California Rare Plant Rank):
1A=Presumed Extinct in California
1B=Rare, Threatened, or Endangered in California and elsewhere
2=Rare, Threatened, or Endangered in California, but more common elsewhere
3=Need more information (a Review List)
4=Plants of Limited Distribution (a Watch List)

CRPR Threat Code Extension:
1=Seriously endangered in California (over 80% of occurrences threatened / high degree and immediacy of threat)
2=Fairly endangered in California (20-80% occurrences threatened)
3=Not very endangered in California (<20% of occurrences threatened)

Rincon Biologists reviewed the CDFW BIOS (2015) and the *California Essential Habitat Connectivity Project: A Strategy for Conserving a Connected California* (Spencer et al., 2010) for information on wildlife corridors in the region. *Missing Linkages: Restoring Connectivity to the California Landscape and Critical Linkages: Bay Area & Beyond* (Penrod, et al., 2001 and 2013) identifies movement corridors throughout California, including specific details on corridors in Monterey County, and these reports was also reviewed for information on regional wildlife movement and known wildlife corridors. The fringe of an Essential Habitat Connectivity Area (ECA) is mapped within the eastern portion of the project site. ECAs represent principle connections between Natural Landscape Blocks. ECAs are regions in which land conservation and management actions should be prioritized to maintain and enhance ecological connectivity. ECAs are mapped based on coarse ecological condition indicators, rather than the needs of particular species and thus serve the majority of species in each region. The project site does not contain regional wildlife corridors. The planted mixed woodland habitat does include wildlife corridor characteristics, such as cover, but does not provide a link between natural habitats. In summary, the project does not contribute to the larger mapped ECA and does not provide a wildlife corridor in either a local or a regional context.

e. Regulatory Setting. Federal, state, and local authorities under a variety of statutes and guidelines share regulatory authority over biological resources. The primary authority for general biological resources lies within the land use control and planning authority of a local jurisdiction, which in this instance is San Benito County. The CDFW is a trustee agency for biological resources throughout the State as defined in the California Environmental Quality Act (CEQA) and also has direct jurisdiction under the California Fish and Game (CFG) Code, which includes, but is not limited to, resources protected by the State of California under the California Endangered Species Act (CESA), as discussed more fully below.

Federal and State.

United States Fish and Wildlife Service. The USFWS implements the Migratory Bird Treaty Act (16 United States Code [USC] Section 703-711) and the Bald and Golden Eagle Protection Act (16 USC Section 668). The USFWS and NMFS share responsibility for implementing the Federal Endangered Species Act (FESA) (16 USC § 153 *et seq.).* The USFWS generally implements the FESA for terrestrial and freshwater species, while the NMFS implements the FESA for marine and anadromous species. Projects that would result in "take" of any federally listed threatened or endangered species are required to obtain permits from the USFWS or NMFS through either Section 7 (interagency consultation with a federal nexus) or Section 10 (Habitat Conservation Plan) of FESA, depending on the involvement by the federal government in permitting and/or funding of the project. The permitting process is used to determine if a project would jeopardize the continued existence of a listed species and what measures would be required to avoid jeopardizing the species. "Take" under the federal definition means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. "Harm" is further defined by the USFWS to include the killing or harming special-status species due to significant obstruction of essential behavior patterns (i.e., breeding, feeding, or sheltering) through significant habitat modifications or degradation. Proposed or candidate species do not have the full protection of FESA; however, the USFWS and NMFS advise project applicants that they could be elevated to listed status at any time.

National Marine Fisheries Service. The NMFS is a component of the National Oceanic and Atmospheric Administration and has jurisdiction over projects in which federally listed marine or river spawning marine fish species (anadromous) may be affected, including coho salmon and steelhead.

United States Army Corps of Engineers. Under Section 404 of the Clean Water Act (CWA), the USACE has authority to regulate activities that result in discharge of dredged or fill material into wetlands or other waters of the United States. Perennial and intermittent creeks are considered waters of the United States if they are hydrologically connected to other jurisdictional waters. Although definitions vary to some degree, wetlands are generally considered to be areas that are periodically or permanently inundated by surface or groundwater, and support vegetation adapted to life in saturated soil. Wetlands are recognized as important features on a regional and national level due to their high inherent value to fish and wildlife, use as storage areas for storm and flood waters, and water recharge, filtration and purification functions. Technical standards for delineating wetlands have been developed by USACE and the USFWS, which generally define wetlands through consideration of three criteria: hydrology, soils, and vegetation. Waters of the United States include wetlands and non-wetland bodies of water that meet specified criteria as defined under applicable regulations. All three of the identified technical criteria discussed above must be met for an area to be identified as a wetland under USACE jurisdiction, unless the area has been modified by human activity. In general, a permit must be obtained before fill can be placed in wetlands or other waters of the United States. The USACE also implements the federal policy embodied in Executive Order 11990, which is intended to result in no net loss of wetlands. In achieving the goals of the CWA, the USACE seeks to avoid adverse impacts and offset unavoidable adverse impacts on existing aquatic resources. Any discharge into wetlands or other "waters of the United States" that are hydrologically connected and/or demonstrate a significant nexus to jurisdictional waters would require a permit from the USACE prior to the start of work. Typically, when a project involves impacts to waters of the United States, the goal of no net loss of wetlands is met through compensatory mitigation involving creation or enhancement of similar habitats.

California Department of Fish and Wildlife (formerly the California Department of Fish and Game). The CDFW derives its authority from the California Fish and Game Code (CFGC). The CESA (Fish and Game Code Section 2050 *et seq.)* prohibits take of state listed species. Take under CESA is restricted to direct mortality of a listed species and does not expressly prohibit indirect harm by way of habitat modification. The CDFW prohibits take for species designated as Fully Protected under the CFGC.

The CFGC sections 3503, 3503.5, and 3511 describe unlawful take, possession, or destruction of birds, nests, and eggs. Fully protected birds (Section 3511) may not be taken or possessed except under specific permit. Section 3503.5 of the CFGC protects all birds-of-prey and their eggs and nests against take, possession, or destruction of nests or eggs. Species of Special Concern (SSC) is a category used by the CDFW for those species, which are considered indicators of regional habitat changes or are considered potential future protected species. Species of Special Concern do not have any special legal status except that which may be afforded by the CFGC as noted above. The SSC category is intended by the CDFW for use as a management tool to include these species into special consideration when decisions are made concerning the development

of natural lands. The CDFW also has authority to administer the Native Plant Protection Act (NPPA) (Fish and Game Code Section 1900 *et seq.*). The NPPA requires the CDFW to establish criteria for determining if a species, subspecies, or variety of native plant is endangered or rare. Under Section 1913(c) of the NPPA, the owner of land where a rare or endangered native plant is growing is required to notify the department at least 10 days in advance of changing the land use to allow for salvage of the plant(s).

Perennial and intermittent streams and associated riparian vegetation, when present, also fall under the jurisdiction of the CDFW. Section 1600 *et seq.* of the CFGC (Lake and Streambed Alteration Agreements) gives the CDFW regulatory authority over work within the stream zone (which could extend to the 100-year flood plain) consisting of, but not limited to, the diversion or obstruction of the natural flow or changes in the channel, bed, or bank of any river, stream or lake.

Regional Water Quality Control Board. In addition, the State Water Resources Control Board (SWRCB) and each of nine local Regional Water Quality Control Boards (RWQCB) are responsible for upholding state water quality standards. Pursuant to Section 401 of the CWA, projects that apply for a USACE permit for discharge of dredge or fill material, and projects that qualify for a Nationwide Permit must obtain water quality certification under Section 401 from the RWQCB.

The SWRCB and each of the RWQCBs also have jurisdiction over "waters of the State" pursuant to the Porter-Cologne Water Quality Control Act which are defined as any surface water or groundwater, including saline waters, within the boundaries of the State. The SWRCB has issued general Waste Discharge Requirements (WDRs) regarding discharges to "isolated" waters of the State (Water Quality Order No. 2004-0004-DWQ, Statewide General Waste Discharge Requirements for Dredged or Fill Discharges to Waters Deemed by the U.S. Army Corps of Engineers to be Outside of Federal Jurisdiction). The local RWQCB enforces actions under this general order for isolated waters not subject to federal jurisdiction, and is also responsible for the issuance of water quality certifications pursuant to Section 401 of the CWA for waters subject to federal jurisdiction.

The Clean Water Act and associated federal regulations (Title 40 of the *Code of Federal Regulations* [CFR] 123.25(a)(9), 122.26(a), 122.26(b)(14)(x) and 122.26(b)(15)) require nearly all construction site operators engaged in clearing, grading, and excavating activities that disturb one acre or more, including smaller sites in a larger common plan of development or sale, to obtain coverage under a National Pollutant Discharge Elimination System (NPDES) permit for their stormwater discharges, and develop a Storm Water Pollution Prevention Plan (SWPP). The NPDES Program is a federal program which has been delegated to the State of California for implementation through the State Water Resources Control Board and the Regional Water Quality Control Boards

Local. General Plans are created by cities and counties to guide the growth and land development of their communities. As such, General Plans typically contain elements, which address protection of biological resources. Typically, these elements are comprised of goals,

policies and actions, which protect natural resources such as environmentally sensitive habitats, special status species, native trees, creeks, wetland, and riparian habitats.

Monterey County 2010 General Plan. The 2010 General Conservation and Open Space Element provide goals, policies, and objectives pertaining to biological resources applicable to this project. Goal OS-5 is focused on the avoidance, minimization and mitigation of significant impacts to biological resources. The associated policies with this goal include the promotion of conservation of listed species; conservation and maintenance of critical habitat; and avoidance, minimization, and mitigation of impacts to listed species and critical habitat. The Carmel Valley Master Plan (CVMP; Monterey County, 2013) Policy CV-3.11 discourages the removal of native oak, madrone and redwood tree in the CVMP Area and requires a permit for the removal of these species.

Monterey County Ordinances. Some resources are afforded protection through local ordinances such as those that protect trees, riparian corridors, and environmentally sensitive habitats. The County of Monterey Zoning Ordinance 21.64.260 calls for the protection and preservation of oaks and other types of native trees.

4.3.3 Impact Analysis

a. Methodology and Significance Thresholds. The evaluation of biological resources is based on a reconnaissance survey conducted by a Rincon Consultants, Inc. biologist on February 5, 2016, review of existing literature and sensitive species occurrence databases as described in Section 4.3.2(e) (Special Status Species), and existing biological resource reports prepared for the project, including a *Biological Assessment* (Rana Creek Habitat Restoration [Rana Creek], 2007) and an *Updated Biological Assessment* (Rana Creek, 2012). These reports are included as Appendix D to this EIR.

Evaluation Criteria. The following thresholds are based on Appendix G of the *State CEQA Guidelines*. Impacts would be significant if the project would result in any of the following:

1. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service;
2. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service;
3. Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;
4. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites; and/or
5. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance; and/or

6. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

As discussed above, no sensitive vegetation communities or riparian habitat are present or have the potential to occur on-site; no federal wetlands or other jurisdictional features are present on-site; no wildlife corridors are present on-site; and the proposed project is not located within the boundaries of an adopted Habitat Conservation Plan, Natural Community Conservation Plan or other approved conservation agreement within the County. Therefore, no impacts to these resources would occur. As a result, thresholds 2, 3, 4, and 6 are not discussed in this section. For a more detailed discussion of these issues, refer to Section 4.16, *Effects Found Not to be Significant*.

b. Project Impacts and Mitigation Measures.

Threshold 1:	*Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.*

Impact B-1 Implementation of the proposed project would impact special status animal species. Potential impacts to special status animal species would be Class II, *significant but mitigable.*

Fifty-four special status animal species were evaluated for their potential to occur within the project site, as shown in Table 4.3-3. Of those, one animal was observed on the project site, one animal was observed in the vicinity of the project site, two animals have the potential to occur within the project site, and one fish species has the potential to occur in the Carmel River, which is 1,050 feet south of the site. Special status species are unlikely to occur within the developed portion of the site because of a lack of natural habitat in this area, but they have been observed and could potentially occur within the mixed woodland and agricultural areas on-site. Potential impacts to special status species that could potentially occur are summarized in Table 4.3-3, and species with a potential to be impacted are discussed in more detail below.

Steelhead (Oncorhynchus mykiss irideus, south-central California coast DPS). The steelhead is federally threatened and a California species of special concern, with critical habitat designated in the Carmel River channel. There is no aquatic habitat within the project site and therefore, this species is not expected occur and no adverse impacts to steelhead are anticipated. However, Steelhead could occur transiently within the Carmel River, as the flow pattern within the river is generally unfavorable for spawning and development. At its closest point the Carmel River is located approximately 1,050 feet to the south of the project site. The Carmel River is designated as critical habitat for the south-central California coast DPS of steelhead (NMFS, 2007).

An indirect impact to steelhead could occur if the proposed project resulted in increased groundwater use that could contribute to a drawdown of the Carmel Valley groundwater table. A drawdown in the groundwater table could reduce streamflow in the Carmel River, which is critical to steelhead migratory access. Decreased streamflow could also reduce water

temperature or dissolved oxygen levels below tolerable ranges for steelhead. Another potential indirect impact to steelhead from groundwater drawdown is the reduction in riparian vegetation along the Carmel River. Riparian vegetation provides shade and contributes to reduced water temperatures required for suitable steelhead habitat.

The water supply for the proposed project would be sourced from two existing on-site wells. As described in the *Carmel Rio Road EIR Groundwater Supply Technical Support* (Todd Groundwater, 2016) and summarized in Section 4.8, H*ydrology and Water Quality,* groundwater pumping proposed for the project would be less than under baseline conditions and while groundwater recharge would decrease, implementation of the proposed project would result in a 53% decrease of net consumptive use of groundwater. This reduction in net consumptive use of groundwater could result in an indirect beneficial affect for steelhead by potentially increasing streamflow in the Carmel River. Increased streamflow could contribute to improved steelhead migratory access, preservation of riparian vegetation, decreased water temperature, and increased levels of dissolved oxygen.

California red-legged frog (Rana draytonii). The California red-legged frog (CRLF) is federally Threatened and a California species of special concern. Critical habitat for the CRLF is mapped to the south, east, and northeast of the project site, as shown in Figure 4.3-2b. The closest critical habitat unit to the project site, MNT2, is adjacent to the Carmel River, approximately 0.1 mile south of the project site. No CRLF were observed within the project site, but there are 19 CNDDB records of CRLF within five miles of the project site, with the closest occurrence approximately 600 feet to the southeast. It should be noted that CRLF are not precluded from traversing agricultural areas (Bulger et al., 2003). No suitable aquatic breeding habitat occurs within the project site, but potentially suitable dispersal habitat does occur within the planted mixed woodland habitat in the southeastern corner of the site. Based on the distance from suitable aquatic habitat within the Carmel River - 1,050 feet at its closest location - and the limited amount of cover within the project site, this species has a low potential to be present in on-site terrestrial habitats. If present, individuals could be significantly impacted during construction and grading within the terrestrial upland refuge areas. However, based on the project site conditions and the facts described above, the potential for impacts is low and these impacts would be potentially significant but mitigable to a less than significant level with implementation of below-referenced mitigation measures.

Monterey dusky-footed woodrat (Neotoma macrotis luciana). The Monterey dusky-footed woodrat, a subspecies of the common woodrat, is a California species of special concern. This species requires dense cover, such as oak woodlands or willow riparian areas. Woodrats nests are typically multi-chamber structures composed of dead woods, leaves and grass and are often found next to trees. Multiple nests with signs of recent activity were observed in the southeastern parcel, which contains the single-family residence and planted mixed woodland habitat, during the 2007 and 2012 reconnaissance surveys (Rana Creek, 2007; Rana Creek, 2012). If present, individuals could be significantly impacted during construction and grading. These impacts would be potentially significant but mitigable to a less than significant level with implementation of below-referenced mitigation measures.

White-tailed kite (Elanus luecurus). White-tailed kite is a state Fully Protected species that breeds in lowland grasslands, wetlands, oak woodland, oak savannah, and riparian areas

adjacent to open fields or grasslands. White-tailed kites are not documented in the CNDDB within five miles of the project site, but individuals were observed foraging in the open fields near the project site during biological surveys (Rana Creek, 2007). No individuals were observed during later surveys at the project site (Rana Creek, 2012). The tall pine and cypress trees on the project site provide potential nesting habitat for kites while the nearby off-site open fields to the east provide potential foraging habitat. This area is currently under agricultural production. If present, individuals could be significantly impacted during construction and grading. These impacts would be potentially significant but mitigable to a less than significant level with implementation of below-referenced mitigation measures.

Burrowing owl (Athene cunicularia). Burrowing owl is a California species of special concern and occupies open dry annual or perennial grasslands, deserts, and scrublands characterized by low growing vegetation. No evidence of burrowing owl activity was observed within the project site; however, the open areas of the site provide marginally suitable habitat for this species. If burrowing owls nest within or adjacent to the project site at the time of construction, direct impacts to the species may occur in the form of mortality, injury and/or harassment.

Mitigation Measures. To reduce impacts to special status animal species, the following mitigation measures are required:

B-1(a) **CRLF Pre-construction Survey and Impact Avoidance.** The following measures shall be implemented during construction of the proposed project.

- Water shall not be impounded in a manner that may attract CRLF.
- All food-related garbage shall be placed in tightly sealed containers at the end of each workday to avoid attracting predators. Containers shall be emptied and garbage removed from the construction site at the end of each workweek. If sealed containers are not available, garbage shall be removed from the construction site upon completion of daily activities. All garbage removed from the construction site shall be disposed of at an appropriate off-site refuse location
- Not less than 14 days prior to the start of any construction activities, including staging and mobilization, a qualified biologist shall conduct pre-construction surveys within suitable upland habitat on-site. If no CRLF are observed, no further mitigation is necessary.
- Pets shall be prohibited at the construction site.

B-1(b) **USFWS Consultation.** If CRLF, during any life stages, are identified within the work area and impacts to individuals cannot be avoided, construction and grading in these areas shall be

halted, and the County and USFWS shall be contacted immediately to initiate FESA Consultation. No CRLF shall be captured and relocated without expressed permission from USFWS.

B-1(c) **Worker Environmental Awareness Training (WEAP).** Prior to initiation of construction activities, including staging and mobilization, all personnel associated with project construction shall attend WEAP training, conducted by a qualified biologist, to aid workers in recognizing special status species and sensitive biological resources that may occur on-site. The program shall include identification of the special status species and their habitats, a description of the regulatory status and general ecological characteristics of sensitive resources, and review of the limits of construction and mitigation measures required to reduce impacts to biological resources within the work area. A fact sheet conveying this information shall also be prepared for distribution to all contractors, their employers, and other personnel involved with construction of the project. All employees shall sign a form documenting that they have attended the WEAP and understand the information presented to them. The form(s) shall be submitted to the implementing agency to document compliance.

B-1(d) **Monterey dusky-footed Woodrat Pre-construction Survey and Impact Avoidance.** If feasible, vegetation removal shall be conducted when woodrats are least likely to breed in October through November. No more than 30 days prior to construction, a qualified biologist shall conduct a pre-construction survey for Monterey dusky-footed woodrat middens within 50 feet of the work limits. At the discretion of a qualified biologist, an exclusion buffer shall be established around any woodrat middens that can be avoided, and these exclusion zones shall be fenced as Environmentally Sensitive Areas to protect the nest. If a woodrat midden cannot be avoided, potential dismantling and relocation strategies shall be developed and presented to the CDFW by a qualified biologist for review and/or approval.

B-1(e) **White-tailed kite Survey and Impact Avoidance.** Surveys for white-tailed kites shall be conducted by a qualified biologist no more than 14 days prior to initiation of any construction activities, including construction staging and vegetation removal. The surveys shall include the entire disturbance areas plus a 200-foot buffer around any disturbance areas. If no white-tailed kite active nests or roosts are observed, no further mitigation is necessary. If present, white-tailed kite active nest sites and roots shall be fully avoided. Full avoidance shall be documented by regular site visits by a qualified biologist. These site visits shall be documented in a report submitted to the County for verification that the project

complies with full avoidance of nests or roosts. The monitoring and report documentation shall continue for the duration of the project or until the nests or roosts are no longer active.

B-1(f) **Burrowing Owl Avoidance and Minimization.** Pre-construction surveys shall be conducted for burrowing owls in accordance with CDFW-adopted survey protocols (California Burrowing Owl Consortium, 1993). This could entail surveys for winter residents in December and January, in addition to peak nesting season (April 15 through July 15) surveys. All suitable habitat, potential or known burrows, or burrowing owls identified on-site shall be assessed and mapped. Survey results shall be valid only for the season during which the survey is conducted. Surveys shall cover all suitable habitat on-site plus a 500-foot buffer where feasible. If no burrowing owls or habitat are detected, no further action is required.

If, during pre-construction surveys, burrowing owls are detected on-site or within the survey area, all burrowing owls and occupied burrows shall be counted, mapped as stated above, and avoided by establishing a buffer around the occupied burrow(s). The buffer shall be a minimum of 300 feet around nest burrows and 100 feet around non-nest burrows. Buffers shall be demarcated with highly visible construction fencing and no ground disturbance activities shall occur within this buffer until the qualified biologist has determined that the burrow is no longer occupied. If an occupied burrow cannot be avoided, passive relocation may be implemented by a qualified biologist with guidance from the CDFW. No burrowing owls may be trapped. Passive relocation shall be limited to the non-breeding season, typically between April 15 and July 15. Passive relocation may involve installation of one-way doors at burrow entrances for a minimum of five days. Once the qualified biologist has determined that the burrow is no longer occupied, the burrow may be hand excavated to prevent re-occupancy.

Significance After Mitigation. With implementation of the above mitigation measures, potential direct and indirect impacts to sensitive animal species would be reduced to a less than significant level.

Impact B-2 **Construction of the proposed project could directly impact nesting raptors and other avian species protected under existing regulations by causing injury, death, or nest failure. Potential impacts to nesting birds are Class II, *significant but mitigable*.**

The Federal Migratory Bird Treaty Act (MBTA) and CFGC (§§ 3503, 3503.5, 3511, 3513, and 3800) protect most native birds. In addition, the federal and state endangered species acts

protect some bird species listed as threatened or endangered. CFGC Code § 3513 relies on the MBTA by prohibiting any take or possession of birds that are designated by the MBTA as migratory nongame birds, except as allowed by federal rules and regulations promulgated pursuant to the MBTA. In addition, CDFG Code Sections 3503, 3503.5, 3511, and 3800 further protect nesting birds, including song birds (passerine), raptors, and state fully protected birds. Project-related impacts to birds protected by these regulations would occur during the breeding season, because unlike adult birds, eggs and chicks are unable to escape impacts.

Implementation of the proposed project would require removal of trees. If tree removal, land clearing, construction, and grading of the project site occurs within the nesting bird season (February 1 through August 31), the proposed project could potentially impact nesting birds protected under MBTA and CFG Code. Nesting birds present within the grading footprint during grading activities would be directly and indirectly impacted by the proposed project. Special status bird species, as well as many non-special-status species, that may nest on or near the project site, may potentially be disturbed by noise, human presence, lighting, or grading activities associated with the proposed project, which could cause nesting failure and the loss of eggs or nestlings. Disruption of nesting and loss of active bird nests from construction and site preparation would be a potentially significant impact to nesting birds.

Mitigation Measures. To reduce impacts to nesting birds, the following mitigation measure is required:

B-2 **Pre-construction Surveys for Nesting Birds and Raptors.** The nesting season is generally considered February 1 to September 15. For construction activities occurring during the nesting season, surveys for nesting birds and raptors covered by the CFGC and the MBTA shall be conducted by a qualified biologist no more than 14 days prior to initiation of any construction activities. Construction activities include construction staging and vegetation removal. The surveys shall include the entire disturbance areas plus a 200-foot buffer around any disturbance areas. If active nests are located, all construction work shall be conducted outside a buffer zone from the nest to be determined by the qualified biologist. The buffer shall be a minimum of 50 feet for non-raptor bird species and at least 150 feet for raptor species. Larger buffers may be required depending upon the status of the nest and the construction activities occurring in the vicinity of the nest. The biologist shall have full discretion for establishing a suitable buffer. The buffer area(s) shall be closed to all construction personnel and equipment until the adults and young are no longer reliant on the nest site. A qualified biologist shall confirm that breeding/nesting is completed and young have fledged the nest prior to removal of the buffer.

Significance After Mitigation. With implementation of the above mitigation measure, potential impacts to nesting bird species would be reduced to a less than significant level.

Threshold 5:	*Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.*

Impact B-3 Construction of the proposed project may require removal of one on-site redwood tree, which is protected under CVMP Policy CV-3.11 and Monterey County Code Section 21.64.260. Pursuant to receipt of a tree removal permit, the project would not conflict with either policy or ordinance. Therefore, potential impacts would be Class III, *less than significant*.

CVMP Policy CV-3.11 discourages the removal healthy native oak, madrone, and redwood trees within the CVMP Area. This policy is codified in Monterey County Code Section 21.64.260(C). No native oaks or madrone trees occur within the project site. However, one redwood tree has been documented within the planed mixed woodland habitat in the southeast portion of the site. This portion of the site would be developed with seven inclusionary units. For the purpose of this analysis, it is assumed that development of these units would require removal of all trees and other vegetation. Thus, the redwood tree may be removed as a result of the proposed project.

Pursuant to Section 21.64.260(C)(2) of the Monterey County Code, redwood trees may be removed within the CVMP area with approval of a tree removal permit. If removal is required, the applicant would be required to first obtain a tree removal permit as outlined in Section 21.64.260(D). This would include a description of the purpose for the tree removal and identification of the size, location, and species of replacement trees. Upon approval of a tree removal permit, the project would not conflict with local policies or ordinances related to tree preservation or removal. Therefore, impacts would be less than significant.

Mitigation Measures. No mitigation is required.

Significance After Mitigation. Impacts would be less than significant without mitigation.

c. Cumulative Impacts. The geographic scope of this cumulative impact analysis is focused on Carmel Valley. This geographic extent is appropriate for biological resources as it represents a generally similar composition of plants and wildlife**.**

Cumulative Impacts to Groundwater Levels and Carmel River Surface Flows. Wildlife habitat in the Carmel Valley has been modified from years of agriculture and development. The Carmel River was historically a perennial water body, but now typically is dry during summer months. This hydrological shift from historic patterns is due incremental increases in groundwater use, resulting in reduced flows. As discussed previously, the project would result in a 53% decrease of net consumptive use of groundwater. This reduction in net consumptive use of groundwater could result in an indirect beneficial affect for steelhead by potentially increasing streamflow in the Carmel River. Therefore, the project would not contribute to cumulative impacts to groundwater levels or surface flows in the Carmel River.

Cumulative Impacts to Special Status Animal Species. The majority of the project site has been used for agricultural purposes, which removed all natural habitats. The remainder of the site consists of planted mixed woodland and development, including an existing single-family residence and associated detached garage. Some special status animal species as described above have a low potential to occur within the project site, and impacts to those species in conjunction with expected development throughout the Carmel Valley could be significant given the already reduced distribution and abundance of these species that has resulted from development. However, mitigation measures to avoid and minimize impacts to these species are required and would reduce impacts to a less than significant level. In combination with similar measures to protect sensitive biological resources on other development projects in the Carmel Valley, it is anticipated that cumulative impacts on special status species would not be cumulatively considerable and the project's contribution would be less than significant.

Summary. Compliance with applicable federal, state, and local regulations relating to preservation of sensitive species in these areas, and adherence to the proposed mitigation measures outlined above for each of the specific potential impacts to biological resources, would reduce cumulative biological impacts to a less than significant level. Development of an agricultural field surrounded by existing fenced agricultural and residential uses and served by existing roadways would not further fragment surrounding habitat. As discussed above, the proposed project would not fragment off-site Carmel River habitat, either on a project specific basis or cumulatively. Although implementation of the project would remove a small amount of marginal wildlife foraging habitat, the project is not expected to contribute significantly to cumulative impacts to biological resources, when combined with other expected development in the area, and cumulative impacts would be less than significant.

4.4 CLIMATE CHANGE

4.4.1 Summary

Table 4.4-1 summarizes the identified environmental impacts, proposed mitigation measures, and residual impacts of the proposed project with regard to climate change. Additional detail is provided in Section 4.4.3 (Impact Analysis).

Table 4.4-1
Impact and Mitigation Summary: Climate Change

Impact	Mitigation Measures	Residual Impact
Impact CC-1 The proposed project would generate greenhouse gas emissions during construction and operation. Greenhouse gas emissions from the project would not exceed accepted thresholds. Impacts would be Class III, less than significant.	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact CC-2 The proposed project would not conflict with State GHG reduction goals, or any applicable plan, policy, or regulation adopted for the purpose of reducing GHG emissions. Impacts would be Class III, less than significant.	No mitigation is required.	Impacts would be less than significant without mitigation.

4.4.2 Setting

a. Climate Change and Greenhouse Gases. Climate change is the observed increase in the average temperature of the Earth's atmosphere and oceans along with other substantial changes in climate-related dynamics such as wind patterns, precipitation, and storms over an extended period of time. The term "climate change" is often used interchangeably with the term "global warming," but "climate change" is preferred because it conveys that there are other changes in addition to rising temperatures. The baseline against which these changes are measured originates in historical records identifying temperature changes that have occurred in the past, such as during previous ice ages. The global climate is continuously changing, as evidenced by repeated episodes of substantial warming and cooling documented in the geologic record. The rate of change has typically been incremental, with warming or cooling trends occurring over the course of thousands of years. The past 10,000 years have been marked by a period of incremental warming, as glaciers have steadily retreated across the globe. However, scientists have observed acceleration in the rate of warming during the past 150 years. Per the United Nations Intergovernmental Panel on Climate Change (IPCC, 2013), the understanding of anthropogenic warming and cooling influences on climate has led to a confidence level of 95% or greater chance that the global average net effect of human activities has been the dominant cause of warming since the mid-20th century (IPCC, 2013).

Gases that absorb and re-emit infrared radiation in the atmosphere are called greenhouse gases (GHGs). GHGs are present in the atmosphere naturally, are released by natural sources, or are

formed from secondary reactions taking place in the atmosphere. The gases that are widely seen as the principal contributors to human-induced climate change include carbon dioxide (CO_2), methane (CH_4), nitrous oxides (N_2O), fluorinated gases such as hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). Water vapor is excluded from the list of GHGs because it is short-lived in the atmosphere and its atmospheric concentrations are largely determined by natural processes, such as oceanic evaporation.

GHGs are emitted by both natural processes and human activities. Of these gases, CO_2 and CH_4 are emitted in the greatest quantities from human activities. Emissions of CO_2 are largely by-products of fossil fuel combustion, whereas CH_4 results from off-gassing associated with agricultural practices and landfills. Observations of CO_2 concentrations, globally averaged temperature, and sea level rise are generally well within the range of the extent of the earlier IPCC projections. The recently observed increases in CH_4 and N_2O concentrations are smaller than those assumed in the scenarios in the previous assessments. Each IPCC assessment has used new projections of future climate change that have become more detailed as the models have become more advanced.

Man-made GHGs, many of which have greater heat-absorption potential than CO_2, include fluorinated gases and SF_6 (CalEPA, 2006). Different types of GHGs have varying global warming potentials (GWPs). The GWP of a GHG is the potential of a gas or aerosol to trap heat in the atmosphere over a specified timescale (generally 100 years). Because GHGs absorb different amounts of heat, a common reference gas (CO_2) is used to relate the amount of heat absorbed to the amount of gas emissions, referred to as "carbon dioxide equivalent" (CO_2E), and is the amount of a GHG emitted multiplied by its GWP. Carbon dioxide has a GWP of one. By contrast, methane CH_4 has a GWP of 21, meaning its global warming effect is 21 times greater than carbon dioxide on a molecule per molecule basis (IPCC, 1997).

The accumulation of GHGs in the atmosphere regulates the earth's temperature. Without the natural heat trapping effect of GHGs, the surface of the earth would be about 34°C cooler (CalEPA, 2006). However, it is believed that emissions from human activities, particularly the consumption of fossil fuels for electricity production and transportation, have elevated the concentration of these gases in the atmosphere beyond the level of naturally occurring concentrations. The following discusses the primary GHGs of concern.

Carbon Dioxide. The global carbon cycle is made up of large carbon flows and reservoirs. Billions of tons of carbon in the form of CO_2 are absorbed by oceans and living biomass (i.e., sinks) and are emitted to the atmosphere annually through natural processes (i.e., sources). When in equilibrium, carbon fluxes among these various reservoirs are roughly balanced (USEPA, 2015). CO_2 was the first GHG demonstrated to be increasing in atmospheric concentration, with the first conclusive measurements being made in the last half of the 20th century. Concentrations of CO_2 in the atmosphere have risen approximately 40% since the industrial revolution. The global atmospheric concentration of CO_2 has increased from a pre-industrial value of about 280 parts per million (ppm) to 391 ppm in 2011 (IPCC, 2007; NOAA, 2015. The average annual CO_2 was concentration growth rate was larger between 1995 and 2005 (average: 1.9 ppm per year) than it has been since the beginning of continuous direct atmospheric measurements (1960-2005 average 1.4 ppm per year), although there is year-to-year variability in growth rates (NOAA, 2015). Currently, CO_2 represents an estimated 82.8% of total

GHG emissions (DOE, 2010). The largest source of CO_2, and of overall GHG emissions, is fossil fuel combustion.

Methane. Methane (CH_4) is an effective absorber of radiation, though its atmospheric concentration is less than that of CO_2 and its lifetime in the atmosphere is limited to 10 to 12 years. It has a global warming potential (GWP) approximately 21 times that of CO_2. Over the last 250 years, the concentration of CH_4 in the atmosphere has increased by 148% (IPCC, 2007), although emissions have declined from 1990 levels. Anthropogenic sources of CH_4 include enteric fermentation associated with domestic livestock, landfills, natural gas and petroleum systems, agricultural activities, coal mining, wastewater treatment, stationary and mobile combustion, and certain industrial processes (USEPA, 2015).

Nitrous Oxide. Concentrations of nitrous oxide (N_2O) began to rise at the beginning of the industrial revolution and continue to increase at a relatively uniform growth rate (NOAA, 2015). N_2O is produced by microbial processes in soil and water, including those reactions that occur in fertilizers that contain nitrogen, fossil fuel combustion, and other chemical processes. Use of these fertilizers has increased over the last century. Agricultural soil management and mobile source fossil fuel combustion are the major sources of N_2O emissions. The GWP of nitrous oxide is approximately 310 times that of CO2.

Fluorinated Gases (HFCs, PFCs, and SF_6). Fluorinated gases, such as HFCs, PFCs, and SF_6, are powerful GHGs that are emitted from a variety of industrial processes. Fluorinated gases are used as substitutes for ozone depleting substances, such as chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), and halons, which have been regulated since the mid-1980s because of their ozone-destroying potential and are phased out under the Montreal Protocol (1987) and Clean Air Act Amendments of 1990. Electrical transmission and distribution systems account for most SF_6 emissions, while PFC emissions result from semiconductor manufacturing and as a by-product of primary aluminum production. Fluorinated gases are typically emitted in smaller quantities than CO_2, CH_4, and N_2O, but these compounds have much higher GWPs. SF_6 is the most potent GHG the IPCC has evaluated.

b. Statewide Greenhouse Gas Emissions Inventory. Worldwide anthropogenic emissions of GHGs were approximately 46,000 million metric tons (MMT, or gigatonne) CO_2e in 210 (IPCC, 2014). CO_2 emissions from fossil fuel combustion and industrial processes contributed about 65% of total emissions in 2010. Of anthropogenic GHGs, carbon dioxide was the most abundant accounting for 76% of total 2010 emissions. Methane emissions accounted for 16% of the 2010 total, while nitrous oxide and fluorinated gases account for 6 and 2% respectively (IPCC, 2014).

Total U.S. GHG emissions were 6,870 MMT (CO_2e) in 2012 (USEPA, 2016). Total U.S. emissions have increased by 4.7% since 1990; emissions decreased by 1% from 2012 to 2013 (USEPA, 2016). Emissions increased by 1% from 2013 to 2014, which can be attributed to multiple factors driving increased fuel use including year-to-year changes in the prevailing weather and an increase in miles traveled by on-road vehicles (USEPA, 2016). Thirty percent of GHG emissions can be attributed to electricity use, 26% to transportation, 21% to commercial and residential use, and 9% to agriculture.

Based upon the California Air Resources Board (CARB) California Greenhouse Gas Inventory for 2000-2013, California produced 459.3 MMT CO_2E in 2013 (CARB, 2015). The major source of GHG in California is transportation, contributing 37% of the state's total GHG emissions. Industrial sources are the second largest source of the state's GHG emissions (CARB, 2015). California emissions are due in part to its large size and large population compared to other states. However, a factor that reduces California's per capita fuel use and GHG emissions, as compared to other states, is its relatively mild climate. The CARB has projected statewide unregulated GHG emissions for the year 2020 will be 509.4 MMT CO_2e (CARB, 2014a). These projections represent the emissions that would be expected to occur in the absence of any GHG reduction actions.

c. Potential Effects of Climate Change. Globally, climate change has the potential to affect numerous environmental resources through potential impacts related to future air temperatures and precipitation patterns. Scientific modeling predicts that continued GHG emissions at or above current rates would induce more extreme climate changes during the 21st century than were observed during the 20th century. Long-term trends have found that each of the past three decades has been warmer than all the previous decades in the instrumental record, and the decade from 2000 through 2010 has been the warmest. The global combined land and ocean temperature data show an increase of about 0.89°C (0.69°C–1.08°C) over the period 1901–2012 and about 0.72°C (0.49°C–0.89°C) over the period 1951–2012 when described by a linear trend. Several independently analyzed data records of global and regional Land-Surface Air Temperature (LSAT) obtained from station observations are in agreement that LSAT as well as sea surface temperatures have increased. In addition to these findings, there are identifiable signs that global warming is currently taking place, including substantial ice loss in the Arctic over the past two decades (IPCC, 2013).

According to the CalEPA's *2010 Climate Action Team Biennial Report*, potential impacts of climate change in California may include loss in snow pack, sea level rise, more extreme heat days per year, more high ozone days, more large forest fires, and more drought years (CalEPA, 2010). Below is a summary of some of the potential effects that could be experienced in California as a result of climate change.

Sea Level Rise. According to *The Impacts of Sea-level Rise on the California Coast*, prepared by the California Climate Change Center (CCCC) (2009), climate change has the potential to induce substantial sea level rise in the coming century. The rising sea level increases the likelihood and risk of flooding. The study identifies a sea level rise on the California coast over the past century of approximately eight inches. Based on the results of various climate change models, sea level rise is expected to continue. The California Climate Adaptation Strategy (California Natural Resources Agency, 2009) estimates a sea level rise of up to 55 inches by the end of this century.

Air Quality. Higher temperatures, which are conducive to air pollution formation, could worsen air quality in California. Climate change may increase the concentration of ground-level ozone, but the magnitude of the effect, and, therefore, its indirect effects are uncertain. If higher temperatures are accompanied by drier conditions, the potential for large wildfires could increase, which, in turn, would further worsen air quality. However, if higher temperatures are accompanied by wetter, rather than drier conditions, the rains would tend to temporarily clear

the air of particulate pollution and reduce the incidence of large wildfires, thereby ameliorating the pollution associated with wildfires. Additionally, severe heat accompanied by drier conditions and poor air quality could increase the number of heat-related deaths, illnesses, and asthma attacks throughout the state (CEC, 2009).

Water Supply. Analysis of paleoclimatic data (such as tree-ring reconstructions of stream flow and precipitation) indicates a history of naturally and widely varying hydrologic conditions in California and the west, including a pattern of recurring and extended droughts. Uncertainty remains with respect to the overall impact of climate change on future water supplies in California. However, the average early spring snowpack in the Sierra Nevada decreased by about 10% in the last century, a loss of 1.5 million acre feet of snowpack storage. During the same period, sea level rose eight inches along California's coast. California's temperature has risen 1°F, mostly at night and during the winter, with higher elevations experiencing the highest increase. Many Southern Californian cities have experienced their lowest recorded annual precipitation twice within the past decade. In a span of only two years, Los Angeles experienced both its driest and wettest years on record (DWR, 2008; CCCC, 2009).

This uncertainty complicates the analysis of future water demand, especially where the relationship between climate change and its potential effect on water demand is not well understood. The Sierra snowpack provides the majority of California's water supply by accumulating snow during our wet winters and releasing it slowly when we need it during our dry springs and summers. Based upon historical data and modeling DWR projects that the Sierra snowpack will experience a 25-40% reduction from its historic average by 2050. Climate change is also anticipated to bring warmer storms that result in less snowfall at lower elevations, reducing the total snowpack (DWR, 2008).

Hydrology. As discussed above, climate change could potentially affect: the amount of snowfall, rainfall, and snow pack; the intensity and frequency of storms; flood hydrographs (flash floods, rain or snow events, coincidental high tide and high runoff events); sea level rise and coastal flooding; coastal erosion; and the potential for salt water intrusion. Sea level rise may be a product of climate change through two main processes: expansion of sea water as the oceans warm and melting of ice over land. A rise in sea levels could jeopardize California's water supply due to salt water intrusion. Increased storm intensity and frequency could affect the ability of flood-control facilities, including levees to handle storm events.

Agriculture. California has a $30 billion agriculture industry that produces half of the country's fruits and vegetables. Higher CO_2 levels can stimulate plant production and increase plant water-use efficiency. However, if temperatures rise and drier conditions prevail, water demand could increase; crop-yield could be threatened by a less reliable water supply; and greater air pollution could render plants more susceptible to pest and disease outbreaks. In addition, temperature increases could change the time of year certain crops, such as wine grapes, bloom or ripen, and thereby affect their quality (CCCC, 2006).

Ecosystems and Wildlife. Climate change and the potential resulting changes in weather patterns could have ecological effects on a global and local scale. Increasing concentrations of GHGs are likely to accelerate the rate of climate change. Scientists project that the average global surface temperature could rise by 1.0-4.5°F (0.6-2.5°C) in the next 50 years, and 2.2-10°F

(1.4-5.8°C) in the next century, with substantial regional variation. Soil moisture is likely to decline in many regions, and intense rainstorms are likely to become more frequent. Rising temperatures could have four major impacts on plants and animals: (1) timing of ecological events; (2) geographic range; (3) species' composition within communities; and (4) ecosystem processes, such as carbon cycling and storage (Parmesan, 2006; Parmesan, C and H. Galbraith, 2004).

d. Local Effects of Climate Change. While the above discussion identifies the possible effects of climate change at a global and potentially statewide level, current scientific modeling tools are unable to predict what local impacts may occur with a similar degree of accuracy. In general, regional and local predictions are made based on downscaling statewide models (CalEPA, 2010).

e. Regulatory Setting. The following regulations address both climate change and GHG emissions.

International. The United States is, and has been, a participant in the United Nations Framework Convention on Climate Change (UNFCCC) since it was produced by the United Nations in 1992. The UNFCCC is an international environmental treaty with the objective of, "stabilization of GHG concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system." This is generally understood to be achieved by stabilizing global GHG concentrations between 350 and 400 ppm, in order to limit the global average temperature increases between 2 and 2.4°C above pre-industrial levels (IPCC, 2007). The UNFCCC itself does not set limits on GHG emissions for individual countries or enforcement mechanisms. Instead, the treaty provides for updates called "protocols," that would identify mandatory emissions limits.

Five years later, the UNFCCC brought nations together again to draft the *Kyoto Protocol* (1997). The Kyoto Protocol established commitments for industrialized nations to reduce their collective emissions of six GHGs (CO_2, CH_4, N_2O, SF_6, HFCs, and PFCs) to 5.2% below 1990 levels by 2012. The United States is a signatory of the Kyoto Protocol, but Congress has not ratified it and the United States has not bound itself to the Protocol's commitments (UNFCCC, 2007). The first commitment period of the Kyoto Protocol ended in 2012. Governments, including 38 industrialized countries, agreed to a second commitment period of the Kyoto Protocol beginning January 1, 2013 and ending either December 31, 2017 or December 31, 2020, to be decided by the Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol at its seventeenth session (UNFCCC, 2011).

Federal. The United States Supreme Court in *Massachusetts et al. v. Environmental Protection Agency et. al.* ([2007] 549 U.S. 05-1120) held that the USEPA has the authority to regulate motor vehicle GHG emissions under the federal Clean Air Act.

The USEPA issued a Final Rule for mandatory reporting of GHG emissions facilities that emit more than 25,000 metric tons (MT) CO_2E per year in October 2009. This Final Rule applies to fossil fuel suppliers, industrial gas suppliers, direct GHG emitters, and manufacturers of heavy-duty and off-road vehicles and vehicle engines, and requires annual reporting of emissions. The first annual reports for these sources were due in March 2011.

On May 13, 2010, the USEPA issued a Final Rule that took effect on January 2, 2011, setting a threshold of 75,000 MT CO_2E per year for GHG emissions. New and existing industrial facilities that meet or exceed that threshold will require a permit after that date. On November 10, 2010, the USEPA published the "PSD and Title V Permitting Guidance for Greenhouse Gases." The USEPA's guidance document is directed at state agencies responsible for air pollution permits under the Federal Clean Air Act to help them understand how to implement GHG reduction requirements while mitigating costs for industry. It is expected that most states will use the USEPA's new guidelines when processing new air pollution permits for power plants, oil refineries, cement manufacturing, and other large pollution point sources.

On January 2, 2011, the USEPA implemented the first phase of the Tailoring Rule for GHG emissions Title V Permitting. Under the first phase of the Tailoring Rule, all new sources of emissions are subject to GHG Title V permitting if they are otherwise subject to Title V for another pollutant and they emit at least 75,000 MT of CO_2E per year. Under Phase 1, no sources were required to obtain a Title V permit solely due to GHG emissions. Phase 2 of the Tailoring Rule went into effect July 1, 2011. At that time new sources were subject to GHG Title V permitting if the source emits 100,000 MT CO_2E per year, or they are otherwise subject to Title V permitting for another pollutant and emit at least 75,000 MT CO_2E per year.

On July 3, 2012, the USEPA issued the final rule that retains the GHG permitting thresholds that were established in Phases 1 and 2 of the GHG Tailoring Rule. These emission thresholds determine when Clean Air Act permits under the New Source Review Prevention of Significant Deterioration (PSD) and Title V Operating Permit programs are required for new and existing industrial facilities.

State. California Air Resources Board (CARB) is responsible for the coordination and oversight of State and local air pollution control programs in California. Various statewide and local initiatives to reduce the State's contribution to GHG emissions have raised awareness about climate change and its potential for severe long-term adverse environmental, social, and economic effects.

Assembly Bill (AB) 1493 (2002), referred to as "Pavley," requires CARB to develop and adopt regulations to achieve "the maximum feasible and cost-effective reduction of GHG emissions from motor vehicles." On June 30, 2009, USEPA granted the waiver of Clean Air Act preemption to California for its greenhouse gas emission standards for motor vehicles beginning with the 2009 model year. Pavley I took effect for model years starting in 2009 to 2016 and Pavley II, which is now referred to as "LEV (Low Emission Vehicle) III GHG" will cover 2017 to 2025. Fleet average emission standards would reach 22 per cent reduction by 2012 and 30 per cent by 2016.

In 2005, former Governor Schwarzenegger issued Executive Order (EO) S-3-05, establishing statewide GHG emissions reduction targets. EO S-3-05 provides that by 2010, emissions shall be reduced to 2000 levels; by 2020, emissions shall be reduced to 1990 levels; and by 2050, emissions shall be reduced to 80 % of 1990 levels (CalEPA, 2006). In response to EO S-3-05, CalEPA created the Climate Action Team (CAT), which in March 2006 published the Climate Action Team Report (the "2006 CAT Report") (CalEPA, 2006). The 2006 CAT Report identified a recommended list of strategies that the state could pursue to reduce GHG emissions. These are

strategies that could be implemented by various state agencies to ensure that the emission reduction targets in EO S-3-05 are met and can be met with existing authority of the state agencies. The strategies include the reduction of passenger and light duty truck emissions, the reduction of idling times for diesel trucks, an overhaul of shipping technology/infrastructure, increased use of alternative fuels, increased recycling, and landfill methane capture, etc.

California's major initiative for reducing GHG emissions is outlined in Assembly Bill 32 (AB 32), the "California Global Warming Solutions Act of 2006," signed into law in 2006. AB 32 codifies the Statewide goal of reducing GHG emissions to 1990 levels by 2020 (essentially a 15% reduction below 2005 emission levels; the same requirement as under S-3-05), and requires CARB to prepare a Scoping Plan that outlines the main State strategies for reducing GHGs to meet the 2020 deadline. In addition, AB 32 requires CARB to adopt regulations to require reporting and verification of statewide GHG emissions.

After completing a comprehensive review and update process, the CARB approved a 1990 statewide GHG level and 2020 limit of 427 MMT CO_2E. The Scoping Plan was approved by CARB on December 11, 2008, and includes measures to address GHG emission reduction strategies related to energy efficiency, water use, and recycling and solid waste, among other measures. The Scoping Plan includes a range of GHG reduction actions that may include direct regulations, alternative compliance mechanisms, monetary and non-monetary incentives, voluntary actions, and market-based mechanisms.

Executive Order S-01-07 was enacted on January 18, 2007. The order mandates that a Low Carbon Fuel Standard ("LCFS") for transportation fuels be established for California to reduce the carbon intensity of California's transportation fuels by at least 10% by 2020.

Senate Bill (SB) 97, signed in August 2007, acknowledges that climate change is an environmental issue that requires analysis in California Environmental Quality Act (CEQA) documents. In March 2010, the California Resources Agency (Resources Agency) adopted amendments to the State CEQA Guidelines for the feasible mitigation of GHG emissions or the effects of GHG emissions. The adopted guidelines give lead agencies the discretion to set quantitative or qualitative thresholds for the assessment and mitigation of GHGs and climate change impacts.

CARB Resolution 07-54 establishes 25,000 metric tons of GHG emissions as the threshold for identifying the largest stationary emission sources in California for purposes of requiring the annual reporting of emissions. This threshold is just over 0.005% of California's total inventory of GHG emissions for 2004.

Senate Bill (SB) 375, signed in August 2008, enhances the State's ability to reach AB 32 goals by directing CARB to develop regional greenhouse gas emission reduction targets to be achieved from vehicles for 2020 and 2035. In addition, SB 375 directs each of the state's 18 major Metropolitan Planning Organizations (MPO) to prepare a "sustainable communities strategy" (SCS) that contains a growth strategy to meet these emission targets for inclusion in the Regional Transportation Plan (RTP). On September 23, 2010, CARB adopted final regional targets for reducing greenhouse gas emissions from 2005 levels by 2020 and 2035. The Monterey Bay Air Resources District (MBARD) was assigned targets of a 0% reduction in GHGs from

transportation sources from 2005 levels by 2020 and a 5% reduction in GHGs from transportation sources from 2005 levels by 2035.

Renewables Portfolio Standards (RPS) pursuant to SB 1038, SB 1078, SB 1250, and SB 107 requires retail sellers of electricity to increase the amount of renewable energy they procure each year by at least 1 % until 20 % of their retail sales are served with renewable energy.

- *Senate Bill 1038 (Chapter 515, Statutes of 2002). The pertinent provisions of SB 1038 were formerly codified in Public Utilities Code Sections 383.5 and 445, but are now codified in Public Resources Code Sections 25740 through 25751 as a result of Senate Bill 183 (Chapter 666, Statutes of 2003).*
- *Senate Bill 1078; Chapter 516, Statutes of 2002. The pertinent provisions of SB 1078 are codified in Public Utilities Code Section 399.11 through 39.15. This law was subsequently amended to add Sections 399.16, 399.17, and 399.12.5 under Senate Bill 67 (Chapter 731, Statutes of 2003), Assembly Bill 200 (Chapter 5, Statutes of 2005), and Assembly Bill 2189 (Chapter 747, Statutes of 2006), respectively.*
- *Senate Bill 1250; Chapter 512, Statutes of 2006. SB 1250 amends pertinent provisions in Public Resources Code Sections 25740 through 25751*
- *Senate Bill 107; Chapter 464, Statutes of 2006. SB 107 amends pertinent provisions in Public Resources Code Sections 25740 through 25751 and Public Utilities Code Sections 399.11 through 399.16*

In early 2010, CARB adopted a regulation for reducing SF_6 emissions from electric power system gas-insulated switchgear (17 CCR 95350). SF_6 gas is commonly used as an arc quenching and insulating medium for high and medium voltage switchgear systems used in electrical substations. The regulation requires owners of such switchgear to: (1) annually report their SF_6 emissions; (2) determine the emission rate relative to the SF_6 capacity of the switchgear; (3) provide a complete inventory of all gas-insulated switchgear and their SF_6 capacities; (4) produce a SF_6 gas container inventory; and (5) keep all information current for CARB enforcement staff inspection and verification. Changes to the switching station owned by PG&E and any gas insulated switchgear associated with the project would be subject to this regulation.

In April 2011, Governor Brown signed SB 2X requiring California to generate 33% of its electricity from renewable energy by 2020.

For more information on the Senate and Assembly bills, Executive Orders, and reports discussed above, and to view reports and research referenced above, please refer to the following websites: www.climatechange.ca.gov and www.arb.ca.gov/cc/cc.htm.

California Environmental Quality Act. Pursuant to the requirements of SB 97, the Resources Agency has adopted amendments to the State CEQA Guidelines for the feasible mitigation of GHG emissions or the effects of GHG emissions. As noted previously, the adopted State CEQA Guidelines provide general regulatory guidance on the analysis and mitigation of GHG emissions in CEQA documents, while giving lead agencies the discretion to set quantitative or qualitative thresholds for the assessment and mitigation of GHGs and climate change impacts. To date, the San Luis Obispo Air Pollution Control District (SLOAPCD) and the San Joaquin Air Pollution Control District (SJVAPCD) have adopted quantitative

significance thresholds for GHGs. The MBARD has not adopted any recommended quantitative thresholds of significance for GHG emissions.

Local. Monterey County does not currently have an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs. However, the Monterey County General Plan Conservation and Open Space Element includes several goals and policies that encourage energy and water conservation techniques and the use of renewable resources. This includes Policy OS-9.1, which encourages the use of solar, wind, and other renewable resources for agriculture, residential, commercial, industrial, and public building use; Policy OS-9.2, which directs development toward cities, Community Areas, and Rural Centers where energy expended for transportation and provision of services can be minimized; and Policy OS-9.6, which requires the incorporation of features that reduce energy used for transportation, including pedestrian and bicycle pathways and access to transit.

4.4.3 Impact Analysis

a. Methodology and Significance Thresholds. Pursuant to the requirements of SB 97, the Resources Agency adopted amendments to the *State CEQA Guidelines* for the feasible mitigation of GHG emissions or the effects of GHG emissions in March 2010. Section 15064.4, subdivision (b), and Appendix G of the *State CEQA Guidelines* provide guidance regarding the criteria that may be used to assess whether a project's impacts on climate change are significant. These guidelines are used in evaluating the cumulative significance of GHG emissions from the proposed project.

According to the adopted *State CEQA Guidelines*, impacts related to GHG emissions from the proposed project would be significant if the project would:

1. *Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment; and/or*
2. *Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases.*

The vast majority of individual projects do not generate sufficient GHG emissions to create a project-specific impact through a direct influence to climate change; therefore, the issue of climate change typically involves an analysis of whether a project's contribution towards an impact is cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, other current projects, and probable future projects (CEQA Guidelines, Section 15355).

Neither the State, MBARD, nor Monterey County has adopted GHG emissions thresholds, and no GHG emissions reduction plan with established GHG emissions reduction strategies has yet been adopted. MBARD is currently evaluating a percentage-based threshold option (MBARD, 2013); however, MBARD does not have a formal policy recommending specific thresholds, and the threshold is in effect at this time.

Since the MBARD has no adopted thresholds at this time, the MBARD encourages lead agencies to consider a variety of metrics for evaluating GHG emissions and related mitigation measures

as they best apply to the specific project (MBARD, September 19, 2014). MBARD has recommended using the adopted SLOAPCD quantitative emissions thresholds for land use projects. As mentioned previously, SLOAPCD, the air district immediately south and adjacent to the MBARD, has adopted quantitative GHG significance thresholds: this includes a bright-line threshold of 1,150 MT CO2e, as well as an efficiency threshold of 4.9 MT CO2e per service population per year (SLOAPCD, April 2012). Service population is the total residents and employees accommodated by the proposed project. The efficiency threshold is used when a project exceeds the bright-line threshold, to reflect large, GHG-efficient projects that would otherwise significantly exceed the bright-line threshold. The analysis herein uses the bright-line annual threshold of 1,150 MT CO2e.

As identified in §15064.7(c) of the *State CEQA Guidelines*, a lead agency may consider thresholds of significance previously adopted or recommended by other public agencies or recommended by experts, provided the decision of the lead agency to adopt such thresholds is supported by substantial evidence. The SLOAPCD thresholds were designed to ensure that new development would be in compliance with the State's emissions reduction goals, as embodied in AB 32's goal of reducing GHG emissions to 1990 levels by 2020 and the Scoping Plan's strategies for achieving this reduction. Therefore, for the purposes of this project, the project's contribution to cumulative impacts related to GHG emissions and climate change would be cumulatively considerable if the project would produce more than 1,150 MT CO2e per year.

Methodology. Calculations of CO_2, CH_4, and N_2O emissions are provided to identify the magnitude of potential project effects. The analysis focuses on CO_2, CH_4, and N_2O, since these comprise 98.9% of all GHG emissions by volume (IPCC, 2007) and are the GHG emissions that the project would emit in the greatest quantities. Fluorinated gases, such as HFCs, PFCs, and SF_6 were not used in the analysis, as they are primarily associated with industrial processes and the proposed project is for residential development and does not include an industrial component. Emissions of all GHGs are converted into their equivalent weight in CO_2 (CO_2E). While minimal amounts of other main GHGs (such as chlorofluorocarbons [CFCs] would be emitted, they would not substantially add to the calculated CO_2E amounts. Calculations are based on the California Air Pollution Control Officers Association (CAPCOA) *CEQA & Climate Change* white paper (January 2008) and included in the use of the California Climate Action Registry (CCAR) General Reporting Protocol (2009).

GHG emissions associated with the proposed project were calculated using the California Emissions Estimator Model (CalEEMod) version 2013.2.2 (see Appendix C for calculations).

Construction Emissions. Construction of the proposed project would generate temporary GHG emissions primarily due to the operation of the construction equipment and truck trips. CalEEMod estimates construction emissions based on parameters such as the duration of construction activity, area of disturbance, and anticipated equipment used during construction.

To estimate the annual emissions that would result from construction activity associated with the project, GHGs are quantified in CalEEMod and are amortized over the expected life of the project. The amortized emissions are added to the annual average operational emissions and then compared to the applicable operational threshold. MBARD has not yet adopted guidelines for analyzing GHG emissions, however SLOAPCD recommends using a life span of 50 years for residential projects.

Operational Emissions. CalEEMod provides operational emissions of CO_2, N_2O, and CH_4. Emissions from energy use include emission from electricity and natural gas use. The emissions factors for natural gas combustion are based on USEPA's AP-42 (*Compilation of Air Pollutant Emissions Factors)* and CCAR. Electricity Emissions are calculated by multiplying the energy use times the carbon intensity of the utility district per kilowatt hour (CAPCOA, 2013a). The default electricity consumption values in CalEEMod include the California Energy Commission (CEC) sponsored California Commercial End Use Survey (CEUS) and Residential Appliance Saturation Survey (RASS) studies.

Operational emissions, calculated in CalEEMod, are related to area sources, waste generational, water usage, and mobile sources. Emissions associated with area sources, including consumer products, landscape maintenance, and architectural coatings utilize standard emission rates from CARB, USEPA, and district supplied emission factor values (CAPCOA, 2013a). Waste generation emissions are based on the IPCC's methods for quantifying GHG emissions from solid waste using the degradable organic content of waste (CAPCOA, 2013a). Waste disposal rates by land use and overall composition of municipal solid waste in California was primarily based on data provided by the California Department of Resources Recycling and Recovery (CalRecycle). Water and wastewater usage are based on the default electricity intensity from the CEC's 2006 Refining Estimates of Water-Related Energy Use in California, using the average values for Northern and Southern California. Mobile emissions come from vehicle trips to and from the project site.

A limitation of the quantitative analysis of emissions from mobile combustion is that emission models, such as CalEEMod, evaluate aggregate emissions, meaning that all vehicle trips and related emissions assigned to a project are assumed to be new trips and emissions generated by the project itself. Such models do not demonstrate, with respect to a regional air quality impact, what proportion of these emissions are actually "new" emissions, specifically attributable to the proposed project. For most projects, the main contributor to regional air quality emissions is from motor vehicles; however, the quantity of vehicle trips appropriately characterized as "new" is usually uncertain as traffic associated with a project may be relocated trips from other locales. Therefore, because the proportion of "new" versus relocated trips is unknown, the VMT estimate generated by CalEEMod is used as a conservative, "worst-case" estimate.

b. Project Impacts and Mitigation Measures.

Threshold 1:	*Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.*

Impact CC-1 The proposed project would generate greenhouse gas emissions during construction and operation. Greenhouse gas emissions from the project would not exceed accepted thresholds. Impacts would be Class III, *less than significant.*

Construction Emissions. For the purpose of this analysis, construction activity is assumed to occur over a period of approximately eighteen months. As shown in Table 4.4-2, construction of the project would result in emissions totaling 550 MT CO_2E. CO_2E emissions total includes CO_2 and CH_4 emissions, with the conversion allowing for the summation of all

GHG emissions. After amortization, over a lifespan of 50 years, emissions would total 11 MT CO_2E per year.

Table 4.4-2
Estimated Annual Construction Emissions

Emission Source	Annual Emissions (CO_2e)
2017 Construction	393 MT CO_2e
2018 Construction	157 MT CO_2e
Total Construction	550 MT CO_2e
Amortized Over 50-Years	11 MT CO_2e

See CalEEMod Calculations, Appendix C

Operational Emissions. Operational GHG emissions were calculated for area source emissions, energy emissions, mobile source emissions, waste, and water. Each of these sources is discussed below.

Area Source Emissions. CalEEMod was used to calculate direct sources of air emissions located at the project site. These include repainting (assumed once every ten years), consumer product use, fireplaces, and landscape maintenance equipment. Based on default assumptions in CalEEMod for single family homes in Monterey County, this analysis estimates that wood burning fireplaces would be present in 35% of the single family homes and multi-family units, 55% would contain natural gas fireplaces, and 10% would not contain a fireplace. Area emissions are estimated to be 94 MT CO_2E per year.

Energy Use. Operation of the proposed residences would consume both electricity and natural gas. The generation of electricity through combustion of fossil fuels typically yields CO_2, and to a smaller extent, N_2O and CH_4. As discussed above, annual electricity and natural gas emissions can be calculated using default values from the CEC sponsored CEUS and RASS studies which are built into the CalEEMod model. Electricity consumption associated with the project would generate approximately 64MT CO_2E per year. Natural gas use would generate approximately 59 MT CO_2E per year. Thus, overall energy use at the project site would generate an estimated 123 MT CO_2E per year.

Solid Waste Emissions. As required by AB 939, future residents of the proposed project would be expected to divert a minimum of 50% of their waste from landfills, reducing the GHG emissions associated with solid waste. In order to provide a conservative estimate of GHG emissions associated with solid waste, no additional waste reduction strategies were included in the emissions estimate. Based on this estimate, solid waste associated with the project would generate approximately 18 MT CO_2E per year.

Waster Use Emissions. Based on the amount of electricity generated in order to supply and convey water to the proposed project, the project would generate an estimated 7 MT CO_2E per year.

Mobile Emissions. Mobile source GHG emissions were estimated using average daily trips based on the *Val Verde Subdivision Traffic Impact Analysis* (Hatch Mott MacDonald, 2016; refer to Appendix I) and based on the total vehicle miles traveled (VMT) estimated in

CalEEMod. The project would generate an estimated 840,639 annual VMT. As noted above, CalEEMod does not calculate N_2O emissions related to mobile sources. As such, N_2O emissions were calculated based on the project's VMT using calculation methods provided by the California Climate Action Registry General Reporting Protocol (January 2009). The project would emit an estimated 383 MT CO_2e per year from mobile sources (see CalEEMod results in Appendix C).

Because the project site is currently developed with one single-family residence, the net change from existing operational emissions to project operational emissions was found. As seen in Table 4.4-3, net operational emissions would total 634 MT CO_2E per year.

Table 4.4-3
Estimated Annual Operational Emissions

Emission Source	**CO_2E (MT)**
Construction	9
Operational	
Area	94
Energy	123
Solid Waste	18
Water	7
Mobile	
CO_2 and CH_4	365
N_2O	18
Total	**634**
Existing Operational	18
Net Change	**616**
Threshold	*1,150*
Threshold Exceeded?	**No**

See CalEEMod Calculations, Appendix C

While there is no adopted GHG significance threshold that would apply to the proposed project, the most appropriate GHG emissions threshold for the proposed project is the SLOAPCD's adopted threshold of 1,150 CO_2E per year. As the annual emissions would not exceed the SLOAPCD threshold, impacts would be less than significant.

Mitigation Measures. No mitigation would be required.

Significance After Mitigation. Impacts would be less than significant without mitigation.

Threshold 2:	*Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases.*

Impact CC-2 The proposed project would not conflict with State GHG reduction goals, or any applicable plan, policy, or regulation adopted for the purpose of reducing GHG emissions. Impacts would be Class III, *less than significant.*

Monterey County does not currently have an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs. The Monterey County General Plan calls for

the development of a Greenhouse Reduction Plan; however, a plan has yet to be adopted. The Association of Monterey Bay Area Governments (AMBAG) adopted the Sustainable Communities Strategy designed to help the region achieve its SB 375 GHG emissions reduction target, thereby contributing to the overall GHG emissions reduction goals identified in AB 32.

CalEPA's Climate Action Team (CAT) published the 2006 CAT Report which includes GHG emissions reduction strategies intended for projects emitting less than 10,000 tons CO_2E/year. In addition, the California Attorney General's Office has developed Global Warming Measures (2008) and OPR's CEQA and Climate Change (CAPCOA, 2008) document includes greenhouse gas reduction measures intended to reduce GHG emissions in order to achieve statewide emissions reduction goals. All of these measures aim to curb the GHG emissions through suggestions pertaining to land use, transportation, renewable energy, and energy efficiency. Several of these actions are already required by California regulations, such as:

- *AB 1493 (Pavley) requires the state to develop and adopt regulations that achieve the maximum feasible and cost-effective reduction of climate change emissions emitted by passenger vehicles and light duty trucks.*
- *In 2004, CARB adopted a measure to limit diesel-fueled commercial motor vehicle idling.*
- *The Integrated Waste Management Act of 1989 (AB 939, Sher, Chapter 1095, Statutes of 1989) established a 50% waste diversion mandate for California.*
- *Public Resources Code 25402 authorizes the CEC to adopt and periodically update its building energy efficiency standards that apply to newly constructed buildings and additions to and alterations to existing buildings.*
- *California's Renewable Portfolio Standard (RPS), established in 2002, requires that all load serving entities achieve a goal of 33% of retail electricity sales from renewable energy sources by 2020, within certain cost constraints.*
- *Green Building Executive Order, S-20-04 (CA 2004), sets a goal of reducing energy use in public and private buildings by 20% by the year 2015, as compared with 2003 levels.*

In addition, as described in Section 4.4.1(e) (Regulatory Setting), the Monterey County General Plan includes policies relating to energy and water conservation, including Policies OS-9.4, OS-9.5, and CV-5.3. Consistent with the General Plan policies, the project would be located close to transportation and existing services. As described in Section 4.4.1(e), MBARD has not established significance thresholds for GHG emissions, nor has MBARD adopted specific goals or policies designed to reduce GHG emission; however, development on the project site would be required to comply with applicable state regulations and MBARD AQMP plans and policies intended to reduce criteria pollutant emissions, which would also reduce GHG emissions from development on the project site. Refer to Section 4.2, *Air Quality*, for additional detail regarding adopted MBARD plans. Because the project would be required to comply with State regulations adopted to achieve the overall GHG emissions reduction goals identified in AB 32, as well as applicable state regulations and MBARD AQMP plans and policies to reduce criteria pollutant emissions, and would also implement adopted County goals and policies that encourage energy and water conservation techniques and orientation, the project would not conflict with any applicable plan, policy, or regulation intended to reduce GHG emissions. Statewide revisions to the CEQA Guidelines call for substantial reductions in GHG. Expected to be implemented in mid-2017, VMT would be used to determine significant traffic impacts on the environment,

including GHG emissions. These revised methods are not yet in effect and, therefore, do not apply to the proposed project. This impact would be less than significant.

Mitigation Measures. No mitigation would be required.

Significance After Mitigation. Impacts would be less than significant without mitigation.

c. Cumulative Impacts. Greenhouse gases and climate change are, by definition, cumulative impacts. The baseline against which to compare potential impacts of the proposed project includes the natural and anthropogenic drivers of climate change, including worldwide GHG emissions from human activities that have grown more than 70% between 1970 and 2004 (IPCC, 2007). As such, the geographic extent of the climate change and greenhouse gas emissions cumulative impact discussion is worldwide.

As discussed in Section 3.0, *Setting*, there are seven approved and pending projects within the project area. These projects include 524 new dwelling units. With an average household size of 3.3 persons, 524 new dwelling units would increase the population of Monterey County by 1,729 persons. As discussed in Section 4.11, *Population and Housing*, AMBAG has projected a population of 113,628 persons by 2030 in Monterey County, this is an increase of 8,083 persons over the 2016 population. The project's population contribution of 94 persons and the cumulative projects' population contribution of 1,729 persons would not increase the population of Monterey County beyond the projected increase of 8,083 persons.

Impacts associated with GHG emissions are cumulative in nature, as the accumulation of GHGs in the atmosphere contributes to global climate change. As mentioned above, the vast majority of individual projects do not generate sufficient GHG emissions to create an individual project-specific impact through a direct influence to climate change. However, the proposed project in conjunction with other cumulative development in the County would increase the accumulation of GHGs in the atmosphere. Therefore, the issue of climate change typically involves an analysis of whether a project's contribution towards an impact is cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, other current projects, and probable future projects (State CEQA Guidelines, Section 15355).

Neither the State, MBARD, nor Monterey County have adopted GHG emissions thresholds to determine if individual projects are cumulatively considerable. Therefore, for the purposes of this analysis, a project which falls below the impact thresholds discussed above is considered to have a less than significant impact, both individually and cumulatively. As indicated above in Impact GHG-1, GHG emissions associated with the proposed project would not exceed recommended impact thresholds. Therefore, the proposed project's GHG impacts are cumulatively less than significant.

4.5 CULTURAL RESOURCES

4.5.1 Summary

Table 4.5-1 summarizes the identified environmental impacts, proposed mitigation measures, and residual impacts of the proposed project with regard to cultural resources. Additional detail is provided in Section 4.5.3 (Impact Analysis).

Table 4.5-1
Impact and Mitigation Summary: Cultural Resources

Impact	Mitigation Measures	Residual Impact
Impact CR-1 The project site contains a single-family residence and garage, constructed in 1958 and 1962, respectively. Both structures, which would be removed as a result of the project, lack architectural integrity and are not considered historical resources. Therefore, impacts would be Class III, *less than significant.*	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact CR-2 Construction of the proposed project would involve surface excavation, which has the potential to unearth or adversely impact previously unidentified archaeological resources. Impacts would be Class II, *significant but mitigable.*	**CR-2a On-Site Monitoring.** A professional archaeologist and an OCEN Tribal Monitor shall supervise soil disturbing activities such as demolition, excavation, and driveway removal. If at any time, potentially significant archaeological resources are discovered, the Tribal Monitor and/or the archaeologist shall be authorized to temporarily halt work until the find has been evaluated and, if determined significant, until mitigation measures have been formulated and implemented with the concurrence of the County. A sampling of soil may be screened during monitoring to facilitate resource identification and data recovery. At least two single specimen radiocarbon dates shall be obtained. Prior to issuance of any grading or building permits, a copy of a signed agreement between the applicant, archaeologist, and Tribal Monitor shall be submitted to County of Monterey RMA-Planning Department for review and approval. **CR-2b On-Site Pre-construction Meeting.** An on-site pre-construction meeting shall be held between the applicant, the archaeologist, and OCEN Tribal monitor, and the contractor to discuss and assure the understanding of the mitigation	Impacts would be less than significant with implementation of mitigation measures CR-2a through CR-2d.

Table 4.5-1
Impact and Mitigation Summary: Cultural Resources

Impact	Mitigation Measures	Residual Impact
	measures required and the scheduling of construction with regard to monitoring. Prior to issuance of any permits, a letter summarizing what was discussed at the pre-construction meeting between all parties shall be submitted to County of Monterey RMA-Planning. **CR-2c Unanticipated Discovery of Archaeological Remains.** If previously unidentified archaeological resources are encountered during construction or land disturbance activities, work shall stop within 50 feet of the find and the County of Monterey RMA – Planning Department shall be notified immediately to assess the nature, extent, and potential significance of the find. If archaeological resources are found, the applicant shall retain a qualified archaeologist to implement a Phase II subsurface testing program to determine the resource boundaries, assess the integrity of the resource, and evaluate the resource's significance through a study of its features and artifacts. If the resource is determined not to be significant, no capping and/or further archaeological investigation or mitigation shall be required. If the resource is determined to be significant, the County of Monterey may choose to allow the capping of the area containing the resource using culturally sterile and chemically neutral fill material. If such capping occurs, then a qualified archaeologist shall be retained to monitor the placement of fill upon the resource. If a significant resource will not be capped, the results and recommendations of the Phase II study shall determine the need for a Phase III data recovery program designed to record and remove significant cultural materials that could otherwise be tampered with. The results and recommendations of the Phase II study shall determine the need for construction monitoring. If monitoring is warranted, a qualified	

Table 4.5-1
Impact and Mitigation Summary: Cultural Resources

Impact	Mitigation Measures	Residual Impact
	archaeologist shall be retained by the applicant to be present during all earth moving activities that have the potential to affect archaeological or historical resources. A monitoring report shall be submitted to the County upon completion of construction. **CR-2d** The text of mitigation measures CR-2a through CR-2c shall be posted and maintained at the project site for the duration of construction.	
Impact CR-3 Construction of the proposed project would involve surface excavation. Although unlikely, these activities have the potential to unearth and/or impact paleontological resources. Impacts would be Class II, *significant but mitigable*	**CR-2 Fossil Salvage.** If fossils are discovered, a qualified paleontologist or paleontological monitor shall recover them. In the case of a large fossil requiring extensive excavation, the paleontologist shall have the authority to temporarily direct, divert, or halt construction activity to ensure that the fossils(s) can be removed in a safe and timely manner. Once salvaged, fossils shall be identified to the lowest possible taxonomic level, prepared to a curation-ready condition and curated in a scientific institution with a permanent paleontological collection. The curation in a scientific institution shall include all pertinent field notes, photos, data, and maps.	Impacts would be less than significant with implementation of mitigation measure CR-3.
Impact CR-4 Construction of the proposed project would involve excavation, which has the potential to unearth or adversely impact previously unidentified human remains. Impacts would be Class III, *less than significant*.	No mitigation is required.	Impacts would be less than significant without mitigation.

4.5.2 Setting

a. Regional Environmental Setting. The unincorporated area of Monterey County near the lower Carmel Valley contains a number of historic resources, including the Berwick Manor and Orchard and the Carmel Mission. Archaeological and paleontological resources have also been found at numerous sites in the County.
The Carmel River is located approximately 1,050 feet to the south of the site. Prominent geographic features within Monterey County include the Santa Lucia and Gabilan Mountain Ranges, the Salinas and Carmel Valleys, and about 100 miles of coastline.

b. Project Site Setting. The disturbance area of the proposed project encompasses all areas where the proposed project could affect paleontological resources and properties eligible for the National Register of Historic Places (NRHP) or the California Register of Historical

Resources (CRHR). This includes the entire project site, which would be cleared of vegetation, graded, and prepared for development.

c. Historical Background. The following setting information is based on a Preliminary Archaeological Reconnaissance (Archeological Consulting [AC], 2007) and an Addendum to the Preliminary Archaeological Reconnaissance (AC, 2016) prepared for the project site, as well as peer reviews of these reports performed by Rincon Consultants, Inc. in September, 2015 and July 2016. These reports and peer reviews are included as Appendix E to this EIR.

Prehistory and Archaeology. The project site is located in the Central Coast region of California. California prehistoric cultural chronology for the Central Coast can be divided into six periods: the Paleo-Indian Period (ca. 10000-8000 B.C.), the Millingstone Period (8000-3500 B.C.), the Early Period (3500-600 B.C.), the Middle Period (600 B.C.-A.D. 1000), the Middle-Late Transition Period (A.D. 1000-A.D.1250), and the Late Period (A.D. 1250-contact ca. A.D. 1769) (Jones and Klar, 2007; as cited in AC, 2007). The Paleo-Indian Period economy was characterized by hunting and gathering, with an emphasis on aquatic resources in many coastal areas (Jones and Ferneau, 2002; as cited in AC, 2007). The Millingstone Period was characterized by an ecological adaptation to collecting, suggested by the appearance and abundance of well-made milling implements (Jones and Klar, 2007; as cited in AC, 2007). The Early Period had a continued exploitation of inland plant and coastal marine resources, as evidenced by artifacts such as milling slabs and handstones and mortars and pestles, found at sites within the Central Coast region (Jones and Waugh, 1997; as cited in AC, 2007). During the Middle Period, there was a pronounced trend towards greater adaptation to regional or local resources. Related chipped stone tools suitable for hunting were more abundant and diversified, and shell fishhooks became part of the toolkit during this period (Jones and Klar, 2005; Jones and Klar, 2007; as cited in AC, 2007). The Middle-Late Transition Period was marked by relative instability and change, with major changes in diet, settlement patterns, and interregional exchange (Jones and Ferneau, 2002; as cited in AC, 2007). Late Period sites are marked by small, finely worked projectile points. The small projectile points are associated with bow and arrow technology and indicate influence from the Takic migration from the deserts into southern California. Common artifacts identified at Late Period sites include bifacial bead drills, bedrock mortars, hopper mortars, lipped and cupped shell beads, and steatite disk beads (Jones and Klar, 2007; as cited in AC, 2007).

Ethnography. The project site is located within the recognized ethnographic territory of the Costanoan (often called Ohlone) linguistic group. Ohlone territory extends from the point where the San Joaquin and Sacramento Rivers issue into the San Francisco Bay to Point Sur, with the inland boundary most likely constituted by the interior Coast Ranges (Kroeber, 1925; as cited in AC, 2007). The Ohlone language belongs to the Penutian family, with several distinct dialects throughout the region (Kroeber, 1925; as cited in AC, 2007).
The pre-contact Ohlone were semi-sedentary, with a settlement system characterized by base camps of tule reed houses and seasonal specialized camps (Skowronek, 1998; as cited in AC, 2007). Villages were divided into small polities, each of which was governed by a chief responsible for settling disputes, acting as a war leader (general) during times of war, and supervising economic and ceremonial activities (Skowronek, 1998; Kroeber, 1925; as cited in AC, 2007). Social organization appeared flexible to ethnographers and any sort of social hierarchy was not apparent to mission priests (Skowronek, 1998; as cited in AC, 2007).

The group followed a general hunting and gathering subsistence pattern with partial dependence on the natural acorn crop (AC, 2007). Habitation is considered to have been semi-sedentary and occupation sites can be expected most often at the confluence of streams, other areas of similar topography along streams, or in the vicinity of springs (AC, 2007). The locations of resource gathering and processing areas, and the associated temporary campsites, are influenced by the presence of suitable exposures of rock for bedrock mortars, ecotones, the presence of specific resources (oak groves, marshes, quarries, game trails, trade routes, etc.), proximity to water, and the availability of shelter. Ridges and travel corridors are other potential locations for temporary camps (AC, 2007).

a. Cultural Setting. The project site is located within a High Archaeological Sensitivity area in Monterey County. A Phase 1 archaeological survey was performed by AC to investigate the potential presence of archaeological resources on the project site. The following section is based on a Preliminary Archaeological Reconnaissance (AC, 2007) and an Addendum to the Preliminary Archaeological Reconnaissance (AC, 2016) prepared for the project site, as well as peer reviews of these reports performed by Rincon Consultants, Inc. in September, 2015 and July 2016. These reports and peer reviews are included as Appendix E to this EIR.

Archeological. AC performed background research for the project site including an examination of archeological site records, maps, and project files of the Northwest Regional Information Center of the California Historical Resources Information System, located at Sonoma State University. Additionally, personal files and maps were examined for supplemental information. The records search found no previously recorded archeological resources with the project site. Two archaeological sites were identified within one kilometer of the project site, with the nearer site being located 300 meters to the northwest. Additionally, the record search found that a previously conducted cultural resource study included a portion of the project site.

Additionally, the California Inventory of Historical Resources, California Historical Landmarks, and the National Register of Historic Places did not list a cultural resource in the project area.

A field survey of the site performed by AC did not uncover any potentially significant historic period archeological materials. None of the materials frequently associated with prehistoric cultural resources in the area – such as dark midden soil, eroded marine shell fragments, fire-affected rock, flaked or ground stone, weathered bone fragments, formal artifacts, etc. - were observed during reconnaissance. A portion of the project had imported fill, which contained abalone shell fragments. For more details on the background research and field survey, see Appendix E.

Historical. A Phase 1 Historical Review of the residential property on the project site was performed in April 2010 (Seavey, 2010), and a five year review was completed in June 2016 (Seavey, 2016; refer to Appendix E). Both reports were peer reviewed by Rincon Consultants (2016). The following section is based on these reports.

The project site was originally of the Hatton Partition of the Rancho Canada De La Segunda, east of the 1880s Hatton Dairy complex and was originally used for dairy grazing. All extant buildings of the Hatton Dairy Farm complex were demolished in the 1970s. There are small

fields remaining to the north and east of the project site; however, these are under development pressure. In order for the project site to be eligible for historic listing as a part of the Hatton Dairy Farm, the project site requires integrity, the ability to convey significances of the past use. The Monterey County Agricultural Resource Evaluation Handbook employs the seven aspects of Integrity adopted by the National Register of Historic Places: Location, Setting, Design, Materials, Workmanship, and Feeling. The property does not meet any of the seven aspects of integrity, due to no Hatton Dairy Farm structures remaining and the setting not reflecting the project site as an intensive farmstead (Seavey, 2016).

The existing on-site wood house and detached garage were constructed in 1958 and 1962, respectively. Both structures are unrelated to the historic agricultural use of the project site and are architecturally unrelated to each other.

The wood house was determined to lack sufficient architectural distinction or historic significance to be considered eligible for listing in the California Register or qualifying for listing on the Monterey County Historic Resource inventory (Seavey, 2010). This is because the original rural setting has changed; many houses of the same type and style are present in Monterey County; and neither an event of significance, nor any important individual has been identified with the property. See Appendix E for more detail.

The detached garage is one-story, located to the northwest of the rear of the residence. The garage is front-gabled with paired sliding barn doors, and rests on a mud-sill foundation. The exterior features narrow vertical flush wood siding and its low-pitched roof slightly overhangs the eave line. Two windows are along the southern side. Like the house, the garage lacks architectural distinction (Seavey, 2016). No additional ancillary structures are present on the project site.

b. Paleontological Setting. The project site is located in the California Coast Ranges, which is composed of thick Mesozoic and Cenozoic sedimentary rocks. The project site has basement rocks of Salinian Block metamorphic and granitic rocks of Paleozoic and Cretaceous Age. The basement rocks are overlain by younger late Cretaceous to Tertiary, and Quaternary age marine and terrestrial sedimentary rocks with volcanic rock locally present.

Paleontological Sensitivity. Paleontological sensitivity refers to the potential for a geologic unit to produce scientifically significant fossils. Direct impacts to paleontological resources occur when earthwork activities, such as grading or trenching, cut into the geologic deposits (e.g., formations) within which fossils are buried and physically destroy the fossils. Since fossils are the remains of prehistoric animal and plant life, they are considered to be nonrenewable. Such impacts have the potential to be significant. Sensitivity is determined by rock type, past history of the geologic unit in producing significant fossils, and fossil localities recorded from that unit. Paleontological sensitivity is derived from the known fossil data collected from the entire geologic unit, not just from a specific survey.

Currently, two generally accepted paleontological sensitivity classifications are used: the Society of Vertebrate Paleontology (SVP) system outlined in the SVP Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources (SVP, 2010) and the Bureau of Land Management (BLM) Potential Fossil Yield Classification (PFYC) system outlined in the BLM Instruction Memorandum (IM) No. 2008-009 (BLM, 2009). The BLM system

is in general more robust and allows for a finer level of classification than the more general SVP system. The BLM PFYC also allows for a more specific level of sensitivity evaluation to cover situations in which more paleontological data on geologic units is available. The 2010 Monterey County General Plan requires development within high and moderate sensitivity zones and known fossil bearing formations to undergo a paleontological field inspection prior to approval (County of Monterey, 2010).

The project site is located within the Monterey and Seaside quadrangles (Dibblee and Minch, 2007). Based on the geologic units present and the available paleontological information about these units, the SVP classification system provides a sufficient level of detail for assessing paleontological sensitivity within the project site. Affected geologic formations are classified based on the relative abundance of vertebrate fossils and significant non-vertebrate fossils using a scale of high, undetermined, low, and no paleontological sensitivity. Criteria for each sensitivity category are summarized from the SVP Guidelines (SVP, 2010) below:

High Potential: Rock units from which vertebrate or significant invertebrate, plant, or trace fossils have been recovered are considered to have a high potential for containing additional significant paleontological resources. Paleontological potential consists of both (a) the potential for yielding abundant or significant vertebrate fossils or for yielding a few significant fossils, large or small, vertebrate, invertebrate, plant, or trace fossils; and (b) the importance of recovered evidence for new and significant taxonomic, phylogenetic, paleoecologic, taphonomic, biochronologic, or stratigraphic data.1 Rock units which contain potentially datable organic remains older than late Holocene, including deposits associated with animal nests or middens, and rock units which may contain new vertebrate deposits, traces, or trackways are also classified as having high potential.

Undetermined Potential: Rock units for which little information is available concerning their paleontological content, geologic age, and depositional environment are considered to have undetermined potential. Further study is necessary to determine if these rock units have high or low potential to contain significant paleontological resources.

Low Potential: Rock units with low potential for yielding significant fossils are poorly represented by fossil specimens in institutional collections, or based on general scientific consensus only preserve fossils in rare circumstances. The presence of fossils in low potential rock units are the exception, not the rule.

No Potential: Some rock units have no potential to contain significant paleontological resources, for instance high-grade metamorphic rocks created when rocks are subjected to high temperatures and pressures and change form and plutonic igneous rocks created through the cooling and solidification of magma or lava.

[1] Taxonomic data can be any information used to describe, identify, name, and classify organisms. Phylogenetic data can be any information used to develop evolutionary history of a group of organisms, especially as depicted in a family tree, and in paleontology are generally one or more features of fossil morphology. Paleoecologic data include any information that provides evidence for the ecological and environmental conditions in the past, and may include fossil assemblages, plant fossils, microfossils (including pollen and foraminifera) and geologic data on depositional settings. Taphonomic data include any information relating to the environmental conditions affecting the preservation of animal or plant remains, including depositional and geologic setting, post deposition modification, and the contemporary exposure and collection of fossils. Biochronological data include any information relating to the sequence of fossils in a stratigraphic rock record and the temporal relationships within and among taxonomic groups. Stratigraphic data include any information on the sedimentary sequence of rock units, and relates to paleontology as regards the biochronology of fossil groups.

Table 4.5-2 shows the mapped geologic unit within the project site, along with its age and paleontological sensitivity.

Table 4.5-2
Geologic Unit within the Project Site

Geologic Unit	Age	Notes	Paleontological Sensitivity (SVP)
Alluvial gravel, sand and silt/clay of valley areas and flood plains (Qa)	Holocene	Generally considered too young to contain fossils	Low

Source: Dibblee and Minch, 2007.

c. Regulatory Setting.

Federal.

National Register of Historic Places. Federal regulations for cultural resources are primarily governed by Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, which applies to actions taken by federal agencies. The goal of the Section 106 review process is to offer a measure of protection to sites that are determined eligible for listing on the National Register of Historic Places (National Register or NRHP). The criteria for determining NRHP eligibility are found in Title 36 Code of Federal Regulations (CFR) Part 60. Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties and affords the federal Advisory Council on Historic Preservation a reasonable opportunity to comment on such undertakings. The Council's implementing regulations, "Protection of Historic Properties," are found in Title 36 CFR Part 800.

The NRHP is the official list of the Nation's historic places worthy of preservation. Authorized under the NHPA, it is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect the country's historic and archaeological resources. The National Register is administered by the National Park Service under the Secretary of the Interior. Properties listed in the National Register include districts, sites, buildings, structures, and objects that are significant in American history, architecture, archaeology, engineering, and culture. Property owners must agree to such listing. The National Register includes:

All historic areas in the National Park System;
National Historic Landmarks that have been designated by the Secretary of the Interior for their significance to all Americans; and
Properties significant to the nation, state, or community which have been nominated by state historic preservation offices, federal agencies, and tribal preservation offices, and have been approved by the National Park Service (National Park Service, 2016a).
To be considered eligible, a property must meet the National Register Criteria for Evaluation, found in Title 36 CFR Part 60.4. This involves examining the property's age, integrity, and significance as follows:

Age and Integrity. Is the property old enough to be considered historic (generally at least 50 years old) and does it still look much the way it did in the past?

Significance. Is the property associated with events, activities, or developments that were important in the past? With the lives of people who were important in the past? With significant architectural history, landscape history, or engineering achievements? Does it have the potential to yield information through archaeological investigation about our past?
Archaeological site evaluation assesses the potential of each site to meet one or more of the criteria for NRHP eligibility based on visual surface and subsurface evidence, if available, at each site's location, information gathered during the literature and records searches, and the researcher's knowledge of and familiarity with the historic or prehistoric context associated with each site.

American Indian Religious Freedom Act. The American Indian Religious Freedom Act, Title 42 U.S. Code Section 1996, protects Native American religious practices, ethnic heritage sites, and land uses.

National Historic Landmarks. National Historic Landmarks are nationally significant historic places designated by the Secretary of the Interior because they possess exceptional value or quality in illustrating or interpreting the heritage of the United States. Today, fewer than 2,500 historic places bear this national distinction. National Historic Landmarks are places where nationally significant historic events occurred, that are associated with prominent Americans that represent those pivotal ideas that shaped the nation, that teach Americans about their ancient past, or that are premier examples of design or construction. While many historic places are important locally or at a state level, a lesser number have meaning for all Americans. National Historic Landmarks are places that "possess exceptional value or quality in illustrating and interpreting the heritage of the United States" (National Park Service, 2016b).

Paleontological Resources Regulations. Paleontological resources are afforded protection under numerous federal laws and regulations, including the National Environmental Policy Act of 1969, the Antiquities Act of 1906, the Federal Land Policy and Management Act of 1976, Title 43 of the Code of Federal Regulations, and the Paleontological Resources Preservation Act (PRPA). The PRPA was recently enacted as a result of the passage of the Omnibus Public Lands Management Act of 2009 and requires federal land management agencies to manage and protect paleontological resources, affirming the authority of existing policies already in place.

State.

California Register of Historical Resources. According to Section 15064.5(a)(3)(A-D) in the *State CEQA Guidelines*, a resource is considered historically significant under three circumstances: (1) if it is CRHR-listed or determined to be eligible for such listing by the State Historical Resources Commission; (2) if it is included in a local register of historical resources (though this is a presumption that may be rebutted where the agency can prove by a preponderance of the evidence that it is not historically or culturally significant); or (3) if it meets at least one of the following criteria for listing on the CRHR:

1. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
2. Is associated with the lives of persons important in our past;

3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
4. Has yielded, or may be likely to yield, information important in prehistory or history.

When a project would impact an archaeological site, the lead agency must determine whether the site represents a historical resource as defined in Section 15064.5 (a)(3)(A-D), described above. If it the site qualifies as a historical resource, then it is entitled to protection under CEQA. If the site does not meet the requirements of a historical resource, the agency must then determine whether the site is a "unique archaeological resource." Section 21083.2 of the Public Resources Code defines a "unique archaeological resource" to mean "an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

1. Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.
2. Has a special and particular quality such as being the oldest of its type or the best example available of its type.
3. Is directly associated with a scientifically recognized important prehistoric or historic event or person.

Should a site qualify as a unique archaeological resource, it is protected under CEQA. If the agency determines the site does not qualify, then the site merits no further consideration.

Historical resources are significantly affected if there is demolition, destruction, relocation, or alteration of the resource or its surroundings. Preservation in place is the preferred form of mitigation for a historical resource of an archaeological nature as it retains the relationship between artifact and context, and may avoid conflicts with groups associated with the site [PRC 15126.4 (b)(3)(A)]. Impacts to historical resources of an archaeological nature and unique archaeological resources can be mitigated to below a level of significance by:

1. Relocating construction areas such that the site is avoided;
2. Incorporation of sites within parks, greenspace, or other open space;
3. "Capping" or covering the site with a layer of chemically stable soil before building; or
4. Deeding the site into a permanent conservation easement. [PRC 15126.4 (b)(3)(B)]

In the event that resources cannot be preserved, unique archaeological resources can only be excavated as mitigation if they are threatened with damage or destruction by the proposed project. The time and cost limitations that may apply to the excavation of archaeological resources do not apply to activities that determine whether the archaeological resources are unique [PRC 15064.5 (c)(3)].

If an archaeological resource does not meet either the historical resource or the more specific unique archaeological resource definition, impacts do not need to be mitigated [13 PRC 15064.5 (e)]. Where the significance of a site is unknown, it is presumed to be significant for the purpose of the EIR investigation.

Native American Consultation. Prior to the adoption or amendment of a general plan proposed on or after March 1, 2005, Government Code Sections 65352.3 and 65352.4 require a city or county to consult with local Native American tribes that are on the contact list maintained by the Native American Heritage Commission. The purpose is to preserve or mitigate impacts to places, features, and objects described in Public Resources Code Sections 5097.9 and 5097.993 that are located within a city or county's jurisdiction. As the proposed project does not entail a General Plan amendment, no such consultation is required.

Human Remains. Section 7050.5 of the California Health and Safety Code states that in the event of discovery or recognition of any human remains in any location other than a dedicated cemetery, there shall be no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains until the coroner of the county in which the remains are discovered has determined whether or not the remains are subject to the coroner's authority. If the human remains are of Native American origin, the coroner must notify the Native American Heritage Commission within 24 hours of this identification. The Native American Heritage Commission will identify a Native American Most Likely Descendant to inspect the site and provide recommendations for the proper treatment of the remains and associated grave goods. *State CEQA Guidelines* Section 15064.5 directs the lead agency (or Applicant), under certain circumstances, to develop an agreement with the Native Americans for the treatment and disposition of the remains.

Local.

Monterey County General Plan. The Conservation and Open Space Element of the Monterey County General Plan includes specific policies and procedures to identify and protect archaeological, paleontological, and historical resources. The policies encourage avoidance of impacts to significant resources, protection of Native American cemeteries, and preservation of shrines and sacred places to the greatest extent feasible. Where avoidance and preservation in place are not feasible, Phase 2 and Phase 3 archaeological studies shall be carried out, as appropriate, and the requirements of CEQA and other state laws will apply. The objectives and policies applicable to this project are discussed in greater detail in Section 4.9, *Land Use.*

Monterey County Code of Ordinances. The Monterey County Zoning Ordinance provides development standards which help to ensure the protection and appropriate treatment of archaeological sites. Section 21.66.050 requires that a Phase I Inventory of Archaeological Resources be performed for any development located within a High Archeological Sensitivity Zone as mapped on County resource maps, a Moderate Archaeological Sensitivity Zone as mapped on County resource maps and if development requires environmental assessment according to CEQA, a Low Archaeological Sensitivity Zone where specific information is already known to exist which states that archaeological resources are present, or within 250 feet of a known archaeological or tribal resource. Additionally, per Section 21.66.050, development shall avoid impacts to unique archaeological resources and tribal culture resources to the extent feasible. When avoidance is not feasible, a mitigation plan is required.

4.5.3 Impact Analysis

a. Methodology and Significance Thresholds. This evaluation is based on a Preliminary Archaeological Reconnaissance (AC, 2007) and an Addendum to the Preliminary Archaeological Reconnaissance (AC, 2016) prepared for the project site, as well as peer reviews of these reports performed by Rincon Consultants, Inc. in September, 2015 and July 2016. These reports and peer reviews are included as Appendix E to this EIR.

According to Appendix G of the *State CEQA Guidelines*, impacts related to cultural resources from the proposed project would be significant if the project would:

1. Cause a substantial adverse change in the significance of an historical resource as defined in Section 15064.5;
2. Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5;
3. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature of paleontological or cultural value; and/or
4. Disturb any human remains, including those interred outside of formal cemeteries.

The significance of a cultural resource is determined by, among other things, consideration of whether or not that resource can increase our knowledge of the past. The determining factors are site content and degree of preservation. A finding of archaeological significance follows the criteria established in the *State CEQA Guidelines.*

State CEQA Guidelines Section 15064.5 states:

> (3) […] Generally, a resource shall be considered by the lead agency to be "historically significant" if the resource meets the criteria for listing on the California Register of Historical Resources (Pub. Res. Code, § 5024.1, Title 14 CCR, Section 4852) including the following:
>
> (A) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
>
> (B) Is associated with the lives of persons important in our past;
>
> (C) Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
>
> (D) Has yielded, or may be likely to yield, information important in prehistory or history.
>
> (4) The fact that a resource is not listed in, or determined to be eligible for listing in the California Register of Historical Resources, not included in a local register of historical resources (pursuant to section 5020.1(k) of the Public Resources Code), or identified in an historical resources survey (meeting the criteria in section 5024.1(g) of the Public Resources Code) does not preclude a lead agency from determining that the resource may be an historical resource as defined in Public Resources Code sections 5020.1(j) or 5024.1.

> (b) A project with an effect that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on the environment.

Historical resources are significantly affected if there is demolition, destruction, relocation, or alteration of the resource or its surroundings. Generally, impacts to historical resources can be mitigated to below a level of significance by following the Secretary of the Interior's *Guidelines for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings* [Guidelines §15064.6(b)]. In some circumstances, documentation of an historical resource by way of historic narrative photographs or architectural drawings will not mitigate the impact of demolition below the level of significance [Guidelines §15126.4(b)(3)]. Preservation in place is the preferred form of mitigation for a historical resource of an archaeological nature as it retains the relationship between artifact and context, and may avoid conflicts with groups associated with the site [Guidelines §15126.4(b)(3)(A)]. Historic resources of an archaeological nature and unique archaeological resources can be mitigated to below a level of significance by:

Relocating construction areas such that the site is avoided;
Incorporation of sites within parks, greenspace, or other open space;
Capping, or covering the site with a layer of chemically stable soil before building; or
Deeding the site into a permanent conservation easement [Guidelines §15126.4(b)(3)(B)]

If an archaeological resource does not meet the historic resource or the more specific unique archaeological resource definition, impacts do not need to be mitigated [Guidelines §15064.5(e)]. Where the significance of a site is unknown, it is presumed to be significant for the purpose of the EIR investigation.

b. Project Impacts and Mitigation Measures.

Threshold 1:	*Cause a substantial adverse change in the significance of an historical resource as defined in Section 15064.5.*

Impact CR-1 The project site contains a single-family residence and garage, constructed in 1958 and 1962, respectively. Both structures, which would be removed as a result of the project, lack architectural integrity and are not considered historical resources. Therefore, impacts would be Class III, *less than significant.*

The project site contains one single-family residence and a garage, located in the southeast portion of the project site.

The single-family residence was constructed in 1958. The builder of the home is unknown. The residence is a one-story, wood-framed structure in the California Ranch House style of architecture, although the plan is irregular. The home rests on concrete foundations and the exterior wall cladding is a combination of combed wood shingles, with a brick veneer along the

entryway. The home's fenestration is irregular, with a combination of large fixed and banked bay windows on the south end of the living room wing and two-part fixed and casement type industrial steel windows on all other elevations. Residences built in the California Ranch House style were one of the most popular and widely constructed designs of pre and post WWII era and the style of residence is still abundant in residential communities in Monterey County. While the residence is in its original location, the original rural setting has been compromised by surrounding development, including the Carmel Barnyard shopping center to the west and a condominium project south of Rio Road. Additionally, the home lacks sufficient architectural distinction or historic significance. Therefore, the single-family residence is not eligible for listing in the California Register and does not qualify for listing on the Monterey County Historic Resource inventory (Seavey, 2010). As such, it cannot be considered an historic resource as defined by CEQA.

The garage was constructed in 1962, approximately 50 feet northwest of the residence. The garage is wood-framed, has a pair of sliding barn doors, and has narrow vertical flush wood siding with two windows on the southern elevation. The front gabled roof is low-pitched, covered with composition shingles, and slightly overhangs the eave line. The garage rests on a mud-sill foundation. The garage is unrelated to agricultural use and lacks architectural distinction. The structure does not demonstrate strong artistic merit nor demonstrate the influence of a particular architect or builder. Therefore, the 1962 garage does not qualify as architecturally significant (Seavey, 2016).

The project site was once part of the Hatton Dairy Farm. However, all structures related to the Hatton Dairy Farm have been demolished and the majority of the land has been subdivided and developed with commercial and residential use. The existing residence and detached garage were constructed after subdivision of the Hatton Dairy Farm and were not a part of the Hatton Dairy Farm. The current use of the project site as row-crops does not represent the historic use as grazing land for dairy.

As the project site does not represent the historical use of the project site and neither the existing residence nor garage are historically significant, the demolition of the structures and change of use from row-crops to residential development would constitute a less than significant impact to historical resources.

Mitigation Measures. No mitigation is required.

Significance After Mitigation. Impacts would be less than significant without mitigation.

Threshold 2:	*Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5*

Impact CR-2 Construction of the proposed project would involve surface excavation, which has the potential to unearth or adversely impact previously unidentified archaeological resources. Impacts would be Class II, *significant but mitigable.*

While the project site is located in a High Sensitivity area for archaeological resources in Monterey County, the Preliminary Archaeological Reconnaissance (AC, 2007; AC, 2016) found the project site does not contain surface evidence of potentially significant archaeological resources. Both a records search and a field reconnaissance survey were performed and no potentially significant historic period archaeological materials were found in the project area (AC, 2007; AC, 2016). Impacts to known archaeological resources therefore would not occur. However, construction in areas not known to contain archaeological resources may nevertheless affect previously unidentified resources. Although the project site has been subjected to agricultural activity for many years, there remains the potential for construction-related ground disturbance to encounter buried archaeological deposits that lack surface or shallow components.

Significant adverse impacts would occur if construction activities from the implementation of the proposed project would damage unknown cultural resources. Impacts to such resources would be potentially significant.

Mitigation Measures. The following mitigation measures are required.

CR-2a **On-Site Monitoring.** A professional archaeologist and a Tribal Monitor shall supervise soil disturbing activities such as demolition, excavation, and driveway removal. If at any time, potentially significant archaeological resources are discovered, the Tribal Monitor and/or the archaeologist shall be authorized to temporarily halt work until the find has been evaluated and, if determined significant, until mitigation measures have been formulated and implemented with the concurrence of the County. A sampling of soil may be screened during monitoring to facilitate resource identification and data recovery. At least two single specimen radiocarbon dates shall be obtained. Prior to issuance of any grading or building permits, a copy of a signed agreement between the applicant, archaeologist, and Tribal Monitor shall be submitted to County of Monterey RMA-Planning Department for review and approval.

CR-2b **On-Site Pre-construction Meeting.** An on-site pre-construction shall be held between the applicant, the archaeologist, and OCEN Tribal monitor, and the contractor to discuss and assure the understanding of the mitigation measures required and the scheduling of construction with regard to monitoring. Prior to issuance of any permits, a letter summarizing what was discussed at the pre-construction meeting between all parties shall be submitted to County of Monterey RMA-Planning.

CR-2c **Unanticipated Discovery of Archaeological Remains.** If previously unidentified archaeological resources are encountered during construction or land disturbance activities, work shall stop within 50 feet of the find and the County of Monterey RMA –

Planning Department shall be notified immediately to assess the nature, extent, and potential significance of the find. If archaeological resources are found, the applicant shall retain a qualified archaeologist to implement a Phase II subsurface testing program to determine the resource boundaries, assess the integrity of the resource, and evaluate the resource's significance through a study of its features and artifacts.

If the resource is determined not to be significant, no capping and/or further archaeological investigation or mitigation shall be required.

If the resource is determined to be significant, the County of Monterey may choose to allow the capping of the area containing the resource using culturally sterile and chemically neutral fill material. If such capping occurs, then a qualified archaeologist shall be retained to monitor the placement of fill upon the resource. If a significant resource will not be capped, the results and recommendations of the Phase II study shall determine the need for a Phase III data recovery program designed to record and remove significant cultural materials that could otherwise be tampered with. The results and recommendations of the Phase II study shall determine the need for construction monitoring. If monitoring is warranted, a qualified archaeologist shall be retained by the applicant to be present during all earth moving activities that have the potential to affect archaeological or historical resources. A monitoring report shall be submitted to the County upon completion of construction.

CR-2d The text of mitigation measures CR-2a through CR-2c shall be posted and maintained at the project site for the duration of construction.

Significance After Mitigation. Through the on-site monitoring for archeological resources and evaluation of any previously unidentified cultural resources and implication or identified mitigation, if necessary, impacts to previously unidentified archaeological resources would be reduced to a less than significant level.

Threshold 3:	*Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature of paleontological or cultural value.*

Impact CR-3 Construction of the proposed project would involve surface excavation. Although unlikely, these activities have the potential to unearth and/or impact paleontological resources. Impacts would be Class II, *significant but mitigable.*

The project site is mapped as containing Holocene aged alluvial gravel, sand, and silt/clay, which has a low paleontological sensitivity. However, the potential exists for Pleistocene aged

sediments to exist beneath the Holocene aged sediments. Excavations exceeding approximately three to five feet in depth in areas mapped as Holocene-aged alluvial deposits could have the potential to impact underlying Pleistocene aged sediments with high paleontological sensitivity. Direct disturbance of Pleistocene aged sediments has the potential to destroy scientifically significant paleontological resources, and impacts to those resources would be significant.

Mitigation Measures. The following mitigation measure is required.

CR-3 **Fossil Salvage.** If fossils are discovered, a qualified paleontologist or paleontological monitor shall recover them. In the case of a large fossil requiring extensive excavation, the paleontologist shall have the authority to temporarily direct, divert, or halt construction activity to ensure that the fossils(s) can be removed in a safe and timely manner. Once salvaged, fossils shall be identified to the lowest possible taxonomic level, prepared to a curation-ready condition and curated in a scientific institution with a permanent paleontological collection. The curation in a scientific institution shall include all pertinent field notes, photos, data, and maps.

Significance After Mitigation. By monitoring ground disturbance and salvaging any identified resources, impacts to paleontological resources would be reduced to a less than significant level.

Threshold 4:	*Disturb any human remains, including those interred outside of formal cemeteries.*

Impact CR-4 **Construction of the proposed project would involve excavation, which has the potential to unearth or adversely impact previously unidentified human remains. Impacts would be Class III, *less than significant*.**

Grading and construction activities have the potential to unearth previously unidentified human remains. If human remains are unearthed, State Health and Safety Code Section 7050.5 requires that no further disturbance shall occur until the County Coroner has made the necessary findings as to origin and disposition pursuant to Public Resources Code Section 5097.98. If the remains are determined to be of Native American descent, the coroner has 24 hours to notify the NAHC. The NAHC would then identify the person(s) thought to be the Most Likely Descendent (MLD) for the deceased Native American, who would then help determine what course of action should be taken in dealing with the remains.

Adverse impacts would occur if the implementation of the proposed project would result in construction activities that would damage previously unidentified human remains. However, compliance with State Health and Safety Code Section 7050.5 and Public Resources Code Section 5097.98, which require that no further disturbance shall occur until the County coroner has made the necessary findings as to origin and disposition, would reduce impacts to a less than significant level.

Mitigation Measures. No mitigation would be required.

Significance After Mitigation. Pursuant to compliance with existing regulations, impacts would be less than significant.

c. Cumulative Impacts. The geographic scope for considering cumulative impacts to cultural resources is based on the historic, ethnographic, and prehistoric period use patterns of the project site and surrounding region. The geographic extent of cumulative impacts for the historic period is the Carmel Valley. For the ethnographic period, the geographic extent includes the entire traditional Ohlone territory. The geographic context for the prehistoric period includes the Central Coast region within Monterey County and nearby portions of adjacent counties.

The proposed project, in conjunction with other cumulative projects in Carmel Valley, would have the potential to adversely impact additional cultural resources. The absence of recorded cultural and paleontological resources on the project site indicates that it is most likely not connected to broader archaeological or paleontological frameworks in Carmel Valley, or the broader network of Monterey County. As such, development of the site would not contribute to broader cumulative impacts. In addition, with the proposed mitigation measures identified herein, project-specific impacts to cultural resources would be reduced to a less than significant level. Similarly, other individual proposals for cumulative development would be reviewed by the County of Monterey and would undergo environmental review. In the event that future development in Carmel Valley or Monterey County would result in significant impacts to known or unknown cultural or paleontological resources, impacts to such resources would be addressed on a case-by-case basis in accordance with CEQA. Therefore, impacts related to the incremental loss of cultural and paleontological resources would not be cumulatively considerable, and the project's contribution to such impacts would be less than significant.

4.6 GEOLOGY AND SOILS

4.6.1 Summary

Table 4.6-1 summarizes the identified environmental impacts, proposed mitigation measures, and residual impacts of the proposed project with regard to geology and soils. Additional detail is provided in Section 4.6.3 (Impact Analysis).

Table 4.6-1
Impact and Mitigation Summary: Geology and Soils

Impact	Mitigation Measures	Residual Impact
Impact GEO-1 Seismically induced ground shaking could destroy or damage structures and infrastructure, resulting in loss of property or risk to human safety. However, the project's mandatory compliance with applicable California Building Code requirements renders impacts Class III, less than significant.	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact GEO-2 Due to the depth of groundwater on the project site, the potential for seismic related ground failure from liquefaction of underlying soils is moderate. Impacts would be Class III, less than significant.	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact GEO-3 Construction of the proposed project could result in soil erosion or loss of topsoil. However, compliance with existing regulations would reduce impacts to a Class III, less than significant, level.	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact GEO-4 The project site is not located on a geologic unit or soil that is unstable, and would not result in landslides, lateral spreading, subsidence, collapse, or soil expansion. Impacts would be Class III, less than significant.	No mitigation is required.	Impacts would be less than significant without mitigation.

4.6.2 Setting

a. Regional Setting. The Carmel Valley is geologically complex and seismically active. The predominant structural feature in the California Coast Ranges is the San Andreas Fault, which is the structural boundary of the Pacific and North American tectonic plates. Uplift along faults is the primary force that created the mountains and valleys of the Southern Coast Ranges, including the Santa Lucia and Sierra de Salinas Mountains. Erosion and deposition of soil from the uplifted mountains formed broad alluvial fans of well-drained, nutrient rich soil, including the soils found in Carmel Valley.

This region has three active faults with evidence of historic or recent movement. The San Andreas Fault runs through the southeastern portion of Monterey County for approximately 30 miles and poses the greatest seismic hazard to the County. The two other active faults affecting

Monterey County include the Palo Colorado-San Gregorio fault zone and the Monterey Bay fault zone. The Palo Colorado-San Gregorio fault zone connects the Palo Colorado Fault near Point Sur, south of Monterey, with the San Gregorio fault near Point Año Nuevo in Santa Cruz County. The Monterey Bay fault lies seaward of the City of Seaside extending northwesterly to the Pacific Ocean.

b. Project Site Setting. The site is located on the floor of the Carmel Valley approximately 1.5 miles east of the mouth of the Carmel River and the Pacific Ocean. It is situated atop an older river terrace about 1,050 feet north of the active Carmel River channel. The project site is located within the Unites States Geological Survey (USGS) Monterey 7 ½-minute topographic quadrangle at approximate latitude 36.5401N and longitude 121.5401W. This section covers the geology of the project site, its topographic relief, seismic hazards, landslide hazards, and soil characteristics.

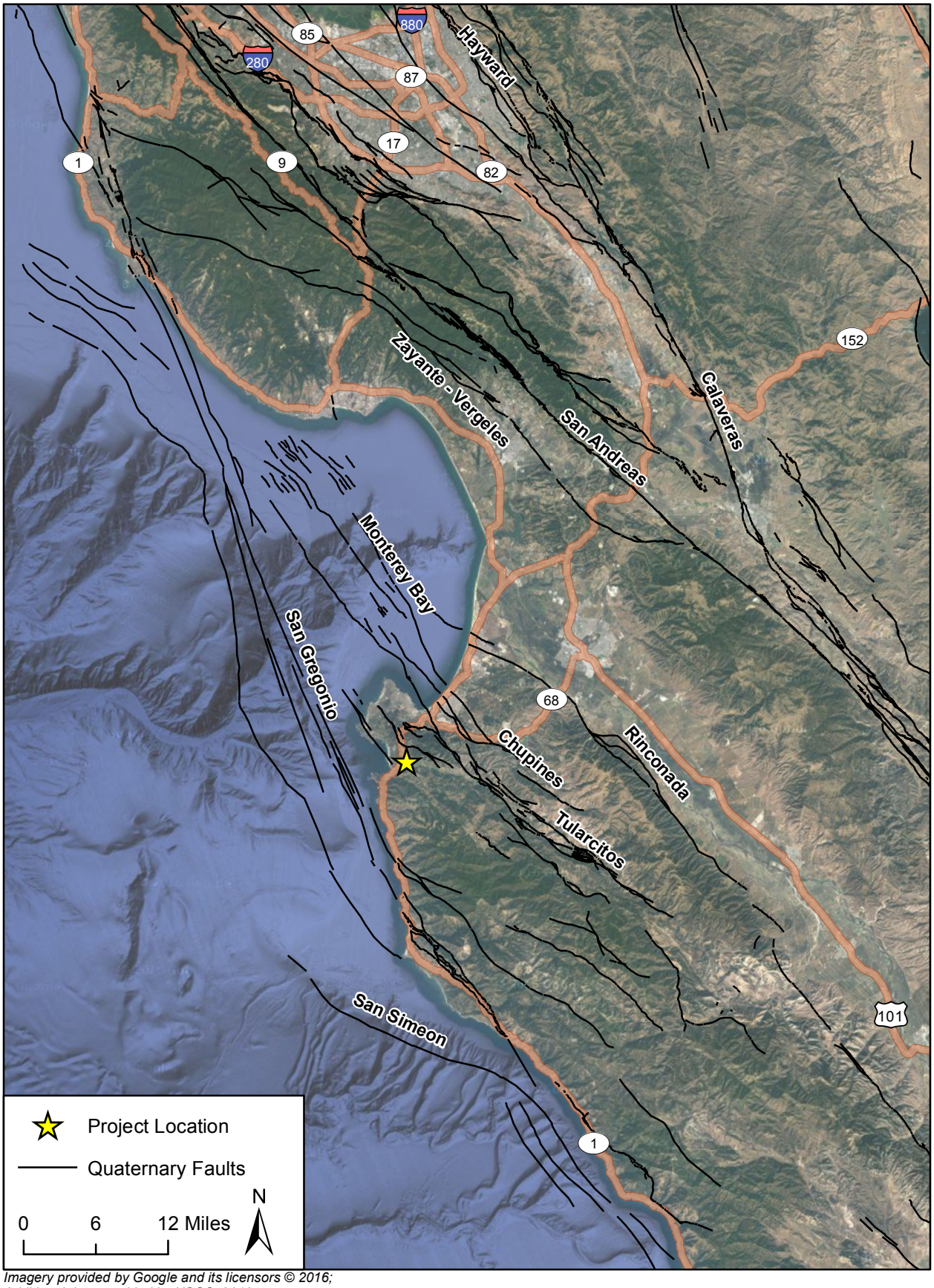
Topography. The site is primarily flat and lies at an elevation of approximately 30 feet. There are no substantial slopes on or adjacent to the site. The site is drained by sheet-flow towards the southwest corner of the site. Val Verde Drive is present along the eastern boundary.

Geology. The project site lies 35 miles west of the San Andreas Fault with basement rocks of Salinian Block metamorphic and granitic rocks of Paleozoic and Cretaceous age. The Salinian basement rocks have been detached and moved northward along the San Andreas Fault system to their present position. The basement rocks are overlain by younger late Cretaceous to Tertiary, and Quaternary age marine and terrestrial sedimentary rocks with volcanic rock locally present. According to the Geologic Hazards Study (Earth Systems Pacific, 2010; refer to Appendix F), the site is underlain by older flood-plain deposits of Holocene age with younger flood-plain deposits of Holocene age on the southwest site corner. These deposits are described as unconsolidated, relatively fine-grained, heterogeneous deposits of sand and silt with common thin layers of clay.

Seismic Hazards. The USGS defines active faults as those that have had surface displacement within Holocene time, or approximately within the last 11,000 years. Evidence of surface displacement can be recognized by the existence of cliffs in alluvium, terraces, offset stream courses, fault troughs and saddles, the alignment of depressions, sag ponds, and the existence of steep mountain fronts. Potentially active faults are those that have had surface displacement during Quaternary time, or within the last 1.6 million years. Inactive faults have not had surface displacement within the last 1.6 million years.

The site is located within the seismically active central California Coast Ranges geomorphic province, but is not located in an Alquist-Priolo Earthquake Fault Zone. The major active faults capable of producing large magnitude events and that have a high seismic activity rate recognized in the region are the San Andreas, Hayward, and San Gregorio faults. Other active faults in the region include the Zayante-Vergeles, Monterey Bay-Tularcitos, and Calaveras faults. There are no faults mapped on or adjacent to the site (Earth Systems Pacific, 2010). Figure 4.6-1 shows the faults in the area in comparison to the project location.

Potential seismic hazards resulting from a nearby moderate to major earthquake can generally be classified as primary and secondary. The primary effect is fault ground rupture, also called



Imagery provided by Google and its licensors © 2016;
Additional data provided by USGS, 2016.

Regional Faults

Figure 4.6-1

County of Monterey

surface rupture. Common secondary seismic hazards include ground shaking, liquefaction, and subsidence. Each of these potential hazards is discussed below.

Surface Rupture. Surface rupture is an actual cracking or breaking of the ground along a fault during an earthquake. Since the site is not located in a State Earthquake Fault Zone and no faults considered to be active lie on or adjacent to the site, the potential for surface ground rupture is considered to be low.

Ground Shaking. Fault displacement can generate seismic ground shaking, which is the greatest cause of widespread damage in an earthquake. Whereas surface rupture affects a narrow area above an active fault, ground shaking covers a wide area and is greatly influenced by the distance of the site to the seismic source, soil conditions, and depth to groundwater. The site is in a region of generally high seismicity and has the potential to experience strong ground shaking from earthquakes on regional and/or local causative faults.

Liquefaction. Soil liquefaction occurs when ground shaking from an earthquake causes a sediment layer saturated with groundwater to lose strength and take on the characteristics of a fluid, thus becoming similar to quicksand. The site lies within an area deemed to have a moderate susceptibility for liquefaction (County of Monterey, 2012). According to the *Geotechnical Engineering Report and Liquefaction Study* prepared for the project (Buena Geotechnical Services, 2007; refer to Appendix F), soils below a depth of 23 feet at the site are likely to liquefy in the event of a nearby large magnitude earthquake.

Seismically-Induced Settlement. Seismically-induced settlement of sufficient magnitude to cause structural damage is normally associated with poorly consolidated, predominantly sandy soils. The project site has loose soil conditions and slightly clayey silty find sands (Buena Geotechnical Services, 2007).

Landslides. Landslides and other forms of mass wasting, including mud flows, debris flows, soil slips, and rock falls, occur as soil or rock moves down slope under the influence of gravity. Intense rainfall or seismic shaking could trigger landslides. The site is essentially flat and there are no substantial slopes on or adjacent to the site. In the site vicinity, large landslide complexes are present approximately 2,000 feet south of the site on the valley wall. Based on their distance from the site, these landslides do not appear to be capable of impacting the site. According to the Geologic Hazards Study, there was no evidence of landsliding on or adjacent to the site in the 1950 aerial photographs reviewed and no evidence of landslides was found during site reconnaissance (Earth Systems Pacific, 2010).

Soil Characteristics. As mapped by the U.S. Department of Agriculture (USDA), Natural Resource Conservation Service (NRCS), the soil type of the project site is Pico Fine Sandy Loam. Pico soils are found on floodplains and alluvial fans and have slow to medium runoff (USDA, 2003). Evaluation of the subsurface indicates that soils are generally dark brown slightly clayey silty fine sands. Reported soil types at the site consisted of sands with some local gravel zones. Groundwater was encountered at an approximate depth of 23 feet (Buena Geotechnical Services, 2007).

Soil erosion is the removal of soil by water and wind. The rate of erosion is estimated from four soil properties: texture, organic matter content, soil structure, and permeability. Other factors

that influence erosion potential include the amount of rainfall and wind, the length and steepness of the slope, and the amount and type of vegetative cover. The erosional hazard for soils at this site is moderately low (USDA, 2016).

c. Regulatory Setting.

Federal.

National Pollutant Discharge Elimination System. Stormwater-related erosion is one major source of soil-related impacts. Stormwater discharges from construction activities (such as clearing, grading, excavating, and stockpiling) that disturb one or more acres, or smaller sites that are part of a larger common plan of development or sale, are regulated under the National Pollutant Discharge Elimination System (NPDES) stormwater program. Prior to discharging stormwater, construction operators must obtain coverage under an NPDES permit. In California, the General Permit for Discharges of Stormwater Associated with Construction Activity are regulated by the State Water Resources Control Board and administered through the local Regional Water Quality Control Board.

The Construction General Permit requires the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP should contain a site map(s) which shows the construction site perimeter, existing and proposed buildings, lots, roadways, storm water collection and discharge points, general topography both before and after construction, and drainage patterns across the project site. The SWPPP must list Best Management Practices (BMPs) the discharger will use to protect storm water runoff and the placement of those BMPs. Additionally, the SWPPP must contain a visual monitoring program; a chemical monitoring program for "non-visible" pollutants to be implemented if there is a failure of BMPs; and a sediment monitoring plan if the site discharges directly to a water body listed on the 303(d) list for sediment. Section A of the Construction General Permit describes the elements that must be contained in a SWPPP.

State.

Alquist-Priolo Earthquake Fault Zoning Act. The Alquist-Priolo Earthquake Fault Zoning Act was signed into California law on December 22, 1972 to mitigate the hazard of surface faulting to structures for human occupancy. The Alquist-Priolo Act provides for special seismic design considerations if developments are planned in areas adjacent to active or potentially active faults. The project site is not located in an Alquist-Priolo Earthquake Fault Zone.

Seismic Hazards Mapping Act. The Seismic Hazards Mapping Act (SHMA) of 1990 (Public Resources Code, Chapter 7.8, Section 2690-2699.6) directs the Department of Conservation, California Geological Survey to identify and map areas prone to earthquake hazards of liquefaction, earthquake-induced landslides and amplified ground shaking. The purpose of the SHMA is to reduce the threat to public safety and to minimize the loss of life and property by identifying and mitigating these seismic hazards. The SHMA was passed by the legislature following the 1989 Loma Prieta earthquake. The Seismic Hazards Mapping Act addresses geo-seismic hazards, other than surface faulting, and applies to public buildings and most private buildings intended for human occupancy.

California Building Code (CBC). The 2013 CBC incorporates by reference and amends requirements in the 2012 International Building Code pertaining to geologic hazards, including seismically resistant construction and foundation and soil investigations prior to construction. The CBC also establishes grading requirements that apply to excavation and fill activities, and requires the implementation of erosion control measures. The County is responsible for enforcing the 2013 CBC.

Local.

Local regulations include Monterey County Code Chapters 16.08 (Grading) and 16.12 (Erosion Control). The project would also be required to comply with the requirements of the Monterey County 2010 General Plan. Specifically, the Monterey Conservation and Open Space Element and Safety Element provide criteria for evaluation of geologic hazards and geotechnical requirements related to new development. Consistency with specific geotechnical policies that apply to the project is evaluated in Section 4.10, *Land Use and Planning.*

Monterey County Code, Chapter 16.08, Grading. Chapter 16.08 of the Monterey County Code regulates grading activities. The purpose of these regulations is to safeguard health, safety, and public welfare, to minimize erosion, protect fish and wildlife, and to otherwise protect the natural environment. A grading permit is required for all activities that would exceed 100 cubic yards of grading. Where grading operations obstruct and/or otherwise impair the flow or runoff of a drainage course, appropriate drainage facilities are required to be implemented to convey flows past the point of obstruction (§16.08.330). Chapter 16.08 also contains measures to protect water quality from grading related activities and associated erosion. These requirements are codified in §16.08.340 of the Monterey County Code, which requires that all areas disturbed in connection with grading related activities shall be consistently maintained to control erosion. The project would be required to comply with these requirements.

Monterey County Code, Chapter 16.12, Erosion Control. Chapter 16.12 of the Monterey County Code requires that development activities control runoff to prevent erosion. The purpose of these regulations is to eliminate and prevent conditions of accelerated erosion that have led to, or could lead to, degradation of water quality, loss of fish habitat, damage to property, loss of topsoil or vegetation cover, disruption of water supply, increased danger from flooding. An erosion control plan is required to be submitted to the County of Monterey prior to any land disturbing activities (§16.12.060). This plan is required to indicate methods to control erosion. Runoff control must be implemented to control runoff from a 10-year storm event (§16.12.070). All runoff must be detained or dispersed so that the runoff rate does not exceed the pre-development level. Any concentrated runoff which cannot be effectively detained or dispersed without causing erosion is to be carried in non-erodible channels or conduits to the nearest drainage course designated for such purpose or to on-site percolation devices with appropriate energy dissipaters to prevent erosion at the point of discharge. Runoff from disturbed areas must be detained or filtered by berms, vegetated filter strips, catch basins, or other means as necessary to prevent the escape of sediment from the disturbed area. The project would be required to comply with these requirements.

4.6.3 Impact Analysis

a. Methodology and Significance Thresholds. This evaluation is based in part on a *Geotechnical Engineering Report and Liquefaction Study* (Buena Geotechnical Services, June 2007) and *Geological Hazards Study* (Earth Systems Pacific, January 2010) prepared for the proposed project. Both of these reports are attached to this EIR as Appendix F. Both reports were peer reviewed by a Rincon Consultants, Inc. certified Engineering Geologist. The analysis also included a review of existing information and other available regional sources, including data from the California Department of Conservation and NRCS.

Based on the environmental checklist included in Appendix G of the *State CEQA Guidelines,* impacts would be considered potentially significant if the proposed project would:

1. *Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:*
    i. *Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault;*
    ii. *Strong seismic shaking*
    iii. *Seismic-related ground failure, including liquefaction,*
    iv. *Landslides;*
2. *Result in substantial soil erosion or the loss of topsoil;*
3. *Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse;*
4. *Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property; and/or*
5. *Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water.*

There are no faults mapped on or adjacent to the site and the site is not located in an Alquist-Priolo Earthquake Fault Zone. The potential for surface ground rupture is therefore considered low. The project site is relatively flat and would not be subject to the risk of landslides. The proposed project also would not involve installation and use of septic tanks or alternative waste water disposal systems. Wastewater from the project site would be collected and conveyed through a conventional gravity system to an existing Carmel Area Wastewater District sanitary sewer main located at the southwest corner of the property. Therefore, impacts related to Thresholds 1.i, 1.iv and 5 are not discussed further in this section, but details are provided in Section 4.15, *Effects Found Not to Be Significant*.

b. Project Impacts and Mitigation Measures.

Threshold 1.ii:	*Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving: strong seismic shaking.*

Impact GEO-1 Seismically induced ground shaking could destroy or damage structures and infrastructure, resulting in loss of

property or risk to human safety. However, the project's mandatory compliance with applicable California Building Code requirements renders impacts Class III, *less than significant*.

The project site is located within the seismically active central California Coast Ranges, but is not located in an Alquist-Priolo Earthquake Fault Zone. The major active faults capable of producing large magnitude events and that have a high seismic activity rate recognized in the region are the San Andreas, Hayward and San Gregorio faults. Other active faults in the site region include the Zayante-Vergeles, Monterey Bay- Tularcitos, and Calaveras faults. Based on the Geologic Hazards Study (Earth Systems Pacific, 2010) and Figure 4.6-1, there are no faults mapped on or adjacent to the site. However, the project would potentially experience strong ground shaking from earthquakes on any active or potentially active faults in the area, as would other properties in the Carmel Valley. The greatest site peak ground acceleration would result from an earthquake on the Monterey Bay – Tularcitos or San Gregorio (south) faults (Earth Systems Pacific, 2010).

Despite the potential for ground shaking, the project would be required meet the current CBC seismic-resistance standards, which ensure that new structures are engineered to withstand the expected ground acceleration at a given location. The County of Monterey also has policies and standards in place that regulate construction in areas subject to fault rupture and ground shaking. For example, General Plan Policy S-1.5 requires that structures in areas that are at high risk from fault rupture not be permitted unless measures recommended by a registered engineering geologist are implemented to reduce the hazard to an acceptable level (County of Monterey, 2010). In addition, in accordance with Policy S-1.8, new development may be approved only if it can be demonstrated that the site is physically suitable and the development would neither create nor significantly contribute to geologic instability or geologic hazards (County of Monterey, 2010). Compliance with all applicable provisions of federal, state, and local construction and design standards, and implementation of the recommendations of the Geotechnical Engineering Report and Liquefaction Study prepared for the project (Buena Geotechnical Services, 2007) would ensure that potential impacts would be less than significant.

Mitigation Measures. No mitigation is required.

Significance After Mitigation. Impacts would be less than significant without mitigation.

Threshold 1.iii:	*Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving seismic-related ground failure, including liquefaction.*
Threshold 3:	*Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse.*

Impact GEO-2 Due to the depth of groundwater on the project site, the potential for seismic related ground failure from

liquefaction of underlying soils is moderate. Impacts would be Class III, *less than significant*.

The site lies within an area deemed to have a moderate susceptibility for liquefaction (County of Monterey, 2012). Based on the project Geotechnical Engineering Report (Buena Geotechnical Services, 2007), soils below a depth of 23 feet at the site are likely to liquefy in the event of a nearby large magnitude earthquake.

Seismically-induced settlement of sufficient magnitude to cause structural damage is normally associated with poorly consolidated, predominantly sandy soils or variable consolidation characteristics within the building areas. The Geotechnical Engineering Report (Buena Geotechnical Services, 2007) noted loose soil conditions and slightly clayey silty fine sands at the site. It is possible that these soils are susceptible to seismically induced settlement.

Implementation of the recommendations of the Geotechnical Engineering Report and Liquefaction Study prepared for the project (Buena Geotechnical Services, 2007) would ensure that potential impacts would be less than significant.

Mitigation Measures. No mitigation is required.

Significance After Mitigation. Impacts would be less than significant without mitigation.

Threshold 2:	*Result in substantial soil erosion or the loss of topsoil.*

Impact GEO-3 Construction of the proposed project could result in soil erosion or loss of topsoil. However, compliance with existing regulations would reduce impacts to a Class III, *less than significant*, level.

According to the NRCS soils mapping for the project site, the project site is underlain by one soil type, Pico Fine Sandy Loam, which has a moderately low erosion potential. Grading associated with construction would temporarily expose bare soils, which could be removed from the site and transported through wind shearing or stormwater runoff.

As discussed in Section 4.8, *Hydrology and Water Quality*, implementation of a NPDES-compliant Stormwater Pollution Prevention Plan (SWPPP) and additional requirements detailed in Chapter 16.12 of the Monterey County Code of Ordinances and other applicable standards would be incorporated into the design of the project and would reduce potential impacts related to soil erosion to a less than significant level.

Mitigation Measures. No mitigation is required.

Significance After Mitigation. Impacts would be less than significant.

Threshold 3:	*Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse.*

Threshold 4:	*Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property.*

Impact GEO-4 The project site is not located on a geologic unit or soil that is unstable, and would not result in landslides, lateral spreading, subsidence, collapse, or soil expansion. Impacts would be Class III, *less than significant.*

Topography at the project site is relatively flat and the proposed project would not affect this topography such that an increased likelihood of landslides would result. The potential for lateral spreading at the site is low due to the flat topography. No documented areas of subsidence have been identified on or near the project site. Additionally, the Geotechnical Engineering Report and Liquefaction Study states that on-site soils have a very low expansion potential (Buena Geotechnical Services, 2007). Impacts related to landslides, lateral spreading, and expansion would therefore be less than significant. Impacts associated with unstable soils would be reduced through implementation of recommendations made in the Geotechnical Engineering Report and Liquefaction Study.

Mitigation Measures. No mitigation is required.

Significance After Mitigation. Impacts would be less than significant.

c. Cumulative Impacts. The geographic scope for considering cumulative impacts to geology and soils is the project site along with the immediately adjacent areas. The geographic scope would also include off-site lands where earth movements at the project site could affect the local watershed. This scope is appropriate because geologic materials and soils occur at specific locales and are generally unaffected by activities not acting on them directly or immediately adjacent to them. In addition any geologic impacts of the project would be site-specific.

Past, present, and reasonably foreseeable future projects in Carmel Valley, as shown in Table 3-1 in Section 3.0, *Environmental Setting*, would add an estimated 524 dwelling units to the Valley. Such development would expose new residents and property to seismic and other geologic hazards. However, these seismic and soil issues are specific to each project and therefore, for purposes of this cumulative analysis, the geographic context is more narrow as well. It is expected that because of the site-specific nature of these issues, each development would be required to address said issues on a case-by-case basis through preparation of required soils and geotechnical engineering studies and adherence to the recommendations therein, in addition to adherence to existing local and state laws and regulations including the applicable CBC standards and requirements. Thus, the combination of the project with other cumulative developments would not have a significant cumulative impact. Furthermore, with adherence to the applicable laws and regulations, the project's contribution to any cumulative geology and soils impacts would be less than significant.

4.7 HAZARDS

4.7.1 Summary

Table 4.7-1 summarizes the identified environmental impacts, proposed mitigation measures, and residual impacts of the proposed project with regard to hazards. Additional detail is provided in Section 4.7.3 (Impact Analysis).

Table 4.7-1
Impact and Mitigation Summary: Hazards

Impact	Mitigation Measures	Residual Impact
Impact HAZ-1 The proposed project would not involve the routine transport, use, or disposal of substantial amounts of hazardous substances. Impacts would be Class III, less than significant.	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact HAZ-2 The project would have the potential to expose workers to asbestos-containing materials and/or lead based paint during demolition of existing on-site structures. However, adherence to regulatory requirements would ensure that the impacts would be Class III, less than significant.	No mitigation is required.	Impacts would be less than significant without mitigation.
HAZ-3 Although no active listed hazardous materials sites listed pursuant to Government Code Section 65962.5 are located on the project site or within one-half mile of the site, disturbance of contaminated soils from prior agricultural use could create a significant hazard to the public or environment, including potential health hazards for construction workers or future residents and occupants of the site. Impacts would be Class II, significant but mitigable.	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact HAZ-4 Residential development on the project site would not occur near roadways on which accidents that involve hazardous materials could occur. In addition, required adherence to existing Federal and State laws and regulations would limit the potential for release of hazardous materials due to upset and accident conditions. Impacts would be Class III, less than significant level.	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact HAZ-5 The proposed project could result in the temporary emission of hazardous materials, substances or waste within one-	No mitigation is required.	Impacts would be less than significant without mitigation.

Table 4.7-1
Impact and Mitigation Summary: Hazards

Impact	Mitigation Measures	Residual Impact
quarter mile of an existing school. However, compliance with existing regulations would ensure that impacts remain Class III, less than significant.		
Impact HAZ-6 The project site is not located in an area subject to a high fire threat, and new development located on the project site would be required to comply with existing regulations intended to minimize the potential effects associated with wildfires. Impacts related to exposing people or structures to a significant risk of loss, injury, or death involving wildland fires would be Class III, less than significant.	No mitigation is required.	Impacts would be less than significant without mitigation.

4.7.2 Affected Environment/Setting

a. Environmental Setting. The undeveloped land east of the project site is currently used for agriculture and therefore has minimal vegetation and is not prone to wildfires. No industrial facilities are within the immediate vicinity of the site. Potential for hazardous materials and wildland fire risk are further discussed below.

The nearest airport to the project site is the Monterey Peninsula Regional Airport, located four miles north. The Monterey Peninsula Airport Comprehensive Land Use Plan (CLUP) establishes procedures and criteria by which the County can address compatibility issues when making planning decisions concerning the airport and surrounding development. According to the CLUP, the project site is located outside any restricted or safety zones and would not require formal review or approval by aviation facilities (Monterey County Airport Land Use Commission 1987).

Hazardous Materials. Hazardous materials are defined as any solid, liquid, or gas that can harm people, other living organisms, property, or the environment. A hazardous material may be radioactive, flammable, explosive, toxic, corrosive, biohazardous, an oxidizer, an asphyxiate, a pathogen, an allergen, or may have other characteristics that render it hazardous in specific circumstances. Issues associated with hazardous materials develop when such materials are improperly stored, transported, used, and/or released into the environment (California Health and Safety Code, Section 25124). Hazards also include physical or natural features that pose a threat of injury, such as wildland fires, exposed pipes, or steep slopes.

The following databases compiled pursuant to Government Code Section 65962.5 were checked on July 27, 2016 for known hazardous materials contamination at the project site:

- Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) database
- Geotracker search for leaking underground storage tanks (LUSTs)

- Cortese list of Hazardous Waste and Substances Sites
- Department of Toxic Substances Control's (DTSC) Site Mitigation and Brownfields Database

The results of each of these database searches are described below.

CERCLIS Database. No superfund sites were located in the vicinity of the project site (CERCLIS database, 2015).

Geotracker. Three inactive LUST Clean-Up sites were identified near the project site: two located approximately 0.25 mile southwest of the project site; and one located 0.25 mile northwest of the project site (SWRCB, 2016). Releases of gasoline occurred at two of the sites and tetrachloroethylene was released from the third. Cleanup actions for all three sites are complete.

Cortese List. There are no sites identified near the project site with waste constituents above hazardous waste levels outside the waste management unit (California EPA, 2016). The nearest hazardous waste sites are the Fort Ord Landfills, approximately 10.5 miles northeast of the project site. The U.S. Army, acting under the oversight of three federal and state regulatory agencies -- the U.S. Environmental Protection Agency, the California Department of Toxic Substances Control, and the California Regional Water Quality Control Board -- has implemented a program to clean up the contaminated water and close and cap the landfill to stop further contamination. In 2003, an updated health risk assessment indicated the Fort Ord Landfills are not a significant contributor of VOCs in ambient air nor are the landfills a contributor of significant risk to those living downwind, near the landfill site.

DTSC Site Mitigation and Brownfields Database. An active state brownfield site is located 1.6 miles northwest of the project site (DTSC, 2016). The site has been an active site since July 14, 2015. The site is in the initial investigation stage and no cleanup actions have been initiated. The site consists of two multi-story structures on an approximately 0.5 acre parcel. The property is occupied by the Horizon Inn with three service sector rentals within the structures: a dry cleaners, a laundromat, and a health studio. Records indicate that the dry cleaner switched to an environmentally friendly dry cleaning processes by 2010; however, the facility was a permitted perchloroethylene dry cleaning facility from 1993 through 2009, with waste manifests filed with the DTSC.

There are no Superfund sites, active cleanup sites, or active LUST sites recorded in the immediate project vicinity.

Wildfire. Much of the Carmel Valley is covered in combustible vegetation where wildfires are a natural part of the ecosystem. According to the California Department of Forestry and Fire Protection (CAL FIRE, 2008), the project site is in a Local Responsibility Area that is considered a non-Very High Fire Hazard Severity Zone. While other portions of Carmel Valley are designated as Very High Fire Hazard Severity Zones, the properties immediately surrounding the site are similarly designated as having a non-Very High Fire Hazard. Structure losses from wildfire often are due to inappropriate siting of structures, insufficient setbacks from other structures or flammable material, flammable ornamental landscaping, and flammable accessory structures including fences, decks, and arbors (Monterey County, 2010).

Asbestos and Lead-Based Paint. Asbestos is a highly crumbly material often found in buildings constructed prior to 1979, typically used as insulation in walls or ceilings. It was formerly popular as an insulating material; however, it can pose a health risk when very small particles become airborne.

Prior to the enactment of federal regulations limiting their use in the late 1970s, lead-based paint (LBP) was often used in residential construction. Lead is a highly toxic metal that was used for many years in products found in and around homes. Lead may cause a range of health effects, from behavioral problems and learning disabilities, to seizures and death. The primary source of lead exposure in residences is deteriorating LBP. Lead dust can form when LBP is dry scraped, dry sanded or heated. Dust also forms when painted surfaces bump or rub together. Lead-based paint that is in good condition is usually not a hazard.

Naturally Occurring Asbestos. Pursuant to guidance issued by the Governor's Office of Planning and Research, State Clearinghouse, lead agencies are encouraged to analyze potential impacts related to naturally occurring asbestos (NOA). NOA can be released from serpentine and ultramafic rocks when the rock is broken or crushed. At the point of release, the asbestos fibers may become airborne, causing air quality and human health hazards. These rocks are commonly used for unpaved gravel roads, landscaping, fill projects, and other improvement projects in some localities. Asbestos may be released to the atmosphere due to vehicular traffic on unpaved roads during grading.

According to U.S. Geological Survey (2011), NOA is found only in the southern part of Monterey County. The project site is located in the central northern portion of Monterey County, and there is no NOA located within the project site.

b. Regulatory Setting

Federal.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Under CERCLA, adopted 1980, owners and operators of real estate where there is hazardous substance contamination may be held strictly liable for the costs of cleaning up contamination found on their property. No evidence linking the owner/operator with the placement of the hazardous substances on the property is required.

Clean Water Act. The Clean Water Act, adopted 1972, governs the control of water pollution in the United States. This Act is implemented through the National Pollutant Discharge Elimination System (NPDES) program, which requires that permits be obtained for point discharges of wastewater. This Act also requires that stormwater discharges be permitted, monitored, and controlled for various entities.

Resource Conservation and Recovery Act (RCRA). RCRA, adopted 1976, governs and regulates the disposal of solid and hazardous waste, and the management of underground storage tanks in order to protect human health and the environment from potential hazardous materials. Agricultural producers disposing of pesticide waste are exempt as long as they follow practice procedures in accordance with RCRA.

Toxic Substances Control Act (TSCA). TSCA, adopted 1976, provides the United States Environmental Protection Agency (USEPA) with authority to require reporting, testing, restrictions on chemical substances, and to regulate commercial chemicals when they pose an unreasonable health or environmental risk.

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). FIFRA provides Federal regulation of pesticide distribution, sale, and use. All pesticides distributed and used in the U.S. must be registered (licensed) by the USEPA. Registration requires that pesticides are properly labeled and used in accordance with specifications. The registrant must also prove that the substance will not cause unreasonable adverse effects on the environment, including human health risks inconsistent with the standard under Section 408 of the Federal Food, Drug, and Cosmetic Act. Use of each registered pesticide must be consistent with use directions contained on the label or labeling. Individuals applying pesticides must do so in a manner not only consistent with Federal laws, but also consistent with state laws and regulations which may differ from state to state. In general, states have primary authority for compliance monitoring and enforcement against the use of pesticides in violation of the labeling requirements.

State.

Safe Drinking Water and Toxic Enforcement Act (Proposition 65). In California, pursuant to this Act: (1) no person in the course of doing business shall knowingly discharge or release a chemical known to the State to cause cancer or reproductive toxicity into water or into land where such chemical passes or probably will pass into any source of drinking water; and (2) no person in the course of doing business shall knowingly and intentionally expose any individual to a chemical known to the State to cause cancer or reproductive toxicity without first giving clear and reasonable warning to such individual.

California Health and Safety Code (HSC), Division 20, Chapter 6.5, and California Code of Regulations (CCR) Title 22 – Hazardous Waste Management. Waste that is toxic, corrosive, flammable, or reactive when tested in accordance with the CCR, Title 22, Article 11, Section 66693, must be handled, stored, transported, and disposed of in accordance with these regulations, which are more stringent than federal regulations.

HSC, Division 20, Chapter 6.95 - Hazardous Materials Release Response Plans and Inventory. HSC Division 20, Chapter 6.95 mandates the creation of Area and Business Plans, sets forth minimum content requirements for Area and Business Plans related to the handling and release of hazardous materials, and requires an annual inventory submittal.

CCR, Title 19, Division 2, Chapter 4 – Hazardous Material Release Reporting, Inventory, and Response Plans. Persons in possession of hazardous materials are subject to the reporting requirements set forth in CCR Title 19, Division 2, Chapter 4. Additionally, Area Plans and Business Plans are subject to the minimum standards outlined in the chapter, which relate to procedures and protocols, pre-emergency planning, notification and coordination, training, public safety and information, supplies and equipment, and incident critique and follow-up.

Public Resources Code (PRC) Section 4291. PRC Section 4291 requires that any structure on property in or adjoining an mountainous area, forest covered lands, brush covered lands, grass

covered lands or land that is covered in flammable material, shall maintain a defensible space of at least 100 feet or as required by another state law, local ordinance or regulation.

Local.

The Monterey County General Plan, Carmel Valley Master Plan, and County hazards and hazardous materials planning documents guide the County in protecting life and property from hazards.

Monterey County General Plan. The Monterey County General Plan Safety Element contains goals and policies to minimize the risk of fire to new development. The County requires new developments to have automatic fire protection systems, water storage tanks, or a Fuel Modification Zone plan. The County also requires new development to have adequate water available for fire suppression. New developments must be also be constructed to meet the minimum requirements specified in the current adopted state building code, state fire code, Monterey County Code Chapter 18.56, and other nationally recognized standards.

The County also has goals and policies in place in order to adequately prepare and respond to emergencies. For example, new residential development must provide more than one access route for emergency response and evacuation unless exempted by the fire jurisdiction.

Carmel Valley Master Plan (CVMP). The CVMP includes policies related to hazards and hazardous materials that apply to the proposed project. These policies include the maintenance of landscape in way that is consistent with fire safety standards, allowance of emergency tree removal, and requirement of necessary road connections to provide controlled emergency access as determined by the Fire Department and OES).

Monterey County Multi-Jurisdictional Hazard Mitigation Plan. The Monterey County Hazard Mitigation Plan was developed in accordance with the Disaster Mitigation Act of 2000, requiring State and local governments to coordinate mitigation planning and develop a hazard mitigation plan. The Plan recommends specific actions designed to protect the community from local and regional hazards that posed the greatest risk. They include actions to reduce vulnerability to existing hazards, incentives for natural resources protection, and public outreach and awareness programs.

Monterey County Emergency Operations Plan. The Emergency Operations Plan is a regional response plan describing how Monterey County will respond to emergency events and disasters. The Operational Area Coordinating Council (OACC) provides oversight to various Countywide organizations involved in the collaboration and coordination of resources in the event of an emergency. The OACC delivers strategic direction for emergency planning and ensures capabilities of the coordinating organizations. The Emergency Operations Plan is maintained by the Monterey County Office of Emergency Services, which also supports the Emergency Operations Center to address responses to major incidents. The Emergency Operations Plan involves emergency public notification and warning systems, evacuation procedures, and recovery and restoration measures.

Monterey County Community Wildfire Protection Plan. The Monterey County Community Wildfire Protection Plan (MCCWPP) was developed in coordination with CAL FIRE, the United

States Forest Service, the Bureau of Land Management, and Monterey County. The MCCWPP provides Countywide wildfire planning recommendations, and aims to reduce wildfire ignitions, spreading, costs, and losses.

Unit Strategic Fire Plan for San Benito-Monterey. The Unit Strategic Fire Plan for San Benito-Monterey was developed to meet goals set by local agencies and the California Strategic Fire Plan. Carmel Valley is identified within the Plan as a priority area. Goals and potential mitigation actions for Carmel Valley include fuel reduction; public awareness and education; annual inspections of electrical lines and fire safety and clearance requirements; removal of fuels along roadsides; and identifying safe zones in the event of a wildland fire emergency.

4.7.3 Impact Analysis

a. Methodology and Significance Thresholds. This analysis was developed using data from the USEPA, DTSC, and CAL FIRE. Data from these sources was analyzed in the context of the project vicinity and impacts were assessed with consideration to relevant fire protection and hazard mitigation plans.

According to standards based on Appendix G of the *State CEQA Guidelines*, the proposed project would have a potentially significant adverse impact with regard to hazards and hazardous materials if the project would:

1. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials;
2. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment;
3. Emit hazardous emissions or handles hazardous or acutely hazardous materials, substances or waste within one-quarter mile of an existing or proposed school;
4. Be located on a site which is included on a list of hazardous materials compiled by the Government Code Section 65962.5 and, as a result, would create a significant hazard to the public or the environment;
5. Be located within an airport management plan or within two miles of an airport;
6. Impair implementation or physically interfere with an adopted emergency response plan or emergency evacuation plan; and/or
7. Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.

The proposed project is not located within an airport management plan, or within two miles of an airport. Therefore, there would be no impacts related to hazards near airports and private air strips. The project site and adjacent sites are not included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5, so there would be no associated impact Additionally, the implementation of the project would not interfere with Monterey County's Emergency Operations Plan, or any other relevant emergency plan Therefore, impacts related to Thresholds 4, 5, and 6 are not discussed further in this section, but details are provided in Section 4.16, *Effects Found Not to Be Significant*.

b. Project Impacts and Mitigation Measures.

Threshold 1:	*Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.*

Impact HAZ-1 The proposed project would not involve the routine transport, use, or disposal of substantial amounts of hazardous substances. Impacts would be Class III, *less than significant*.

The exposure of people to hazardous chemicals during construction of the proposed project could lead to adverse health effects. Residential construction and uses may involve use and storage of some materials that are considered hazardous. These materials would be limited to typical solvents, paints, chemicals used for cleaning and building maintenance, and landscaping supplies. These materials would not be substantially different from household chemicals and solvents already in general and wide use throughout the County and in the vicinity of the project site at other residences. Therefore, the proposed project would not involve the routine transport, use, or disposal of substantial amounts of hazardous substances.

Mitigation Measures. No mitigation is required.

Significance After Mitigation. Impacts would be less than significant without mitigation.

Impact HAZ-2 The project would have the potential to expose workers to asbestos-containing materials and/or lead based paint during demolition of existing on-site structures. However, adherence to regulatory requirements would ensure that the impacts would be Class III, *less than significant.*

The proposed project would involve the demolition of a single family residence and associated garage located in the southeastern portion of the project site. This residence was constructed in approximately 1958 and the garage in 1962. Due to the age of these structures, they may contain asbestos and/or lead-based paint. As a result, demolition of these structures could result in health hazard impacts to workers if not remediated prior to construction activities.

The project applicant would be required to comply with Monterey Bay Air Resources District (MBARD) Rule 424 (Asbestos Demolition and Renovation), which requires that all building materials that would be disturbed by demolition activities that may contain asbestos be sampled and analyzed. Compliance with Rule 424 would ensure that if the buildings do have asbestos-containing materials, those materials would be found prior to demolition and properly handled and abated. The applicant would also be required to comply with California Occupational Safety and Health Administration (CalOSHA) regulations regarding lead-based materials and California Code of Regulations §1532.1, which requires testing, monitoring, containment, and disposal of lead-based materials such that exposure levels do not exceed CalOSHA standards. Compliance with these regulations would ensure that impacts associated with exposure of construction workers to ACMs or lead would be less than significant.

Mitigation Measures. No mitigation measures are required.

Significance After Mitigation. Impacts would be less than significant without mitigation.

Impact HAZ-3 Although no active listed hazardous materials sites listed pursuant to Government Code Section 65962.5 are located on the project site or within one-half mile of the site, disturbance of contaminated soils from prior agricultural use could create a significant hazard to the public or environment, including potential health hazards for construction workers or future residents and occupants of the site. Impacts would be Class II, *significant but mitigable.*

This analysis addresses potential health hazards from known or potential sites with hazardous materials, contaminated soils from historic agricultural use on the project site.

Listed Sites with Hazardous Materials. Based on a July 2016 search of databases of sites with known or potential hazardous materials, four inactive LUST Clean-Up sites were identified near the project site: two located approximately 0.25 mile southwest; one located 0.35 mile west of the project site; and one located 0.25 mile northwest of the project site (SWRCB, 2016). Releases of gasoline occurred at three of the sites and tetrachloroethylene was released from the fourth. Cleanup actions for all four sites are complete. However, the Department of Toxic Substances Control listed the status of these cleanup sites as "no further action" in 1999, 2005, 2012, 2014, and they do not currently pose a health threat. The project site is not located within one-half mile of any other sites listed for hazardous materials contamination. Therefore, the proposed project would not lead to the exposure of people to hazardous materials from sites listed pursuant to Government Code Section 65962.5.

Residual Agricultural Chemicals. Due to the presence of current and historical agricultural practices on site, the potential exists for the presence of residual quantities of agricultural chemicals and other hazardous materials, including undocumented residual quantities of presently-banned chemicals. Although the site is currently farmed organically, prior agricultural operations may have used such chemicals. Ground disturbing activities during construction could expose construction workers to residual agricultural chemicals in on-site soil via direct contact or inhalation of dust particles. However, the Monterey County Health Department's Environmental Health Bureau would require necessary soil sampling and remediation to be completed prior to filing a final map of the site in accordance with California Department of Toxic Substance Control (DTSC) guidance titled "Interim Guidance for Sampling Agricultural Properties.' Compliance with these regulations would ensure that impacts associated with exposure of construction workers to health risks due to improper handling and disposal of contaminated soils would be less than significant.

Mitigation Measures. No mitigation measures are required.

Significance After Mitigation. Impacts would be less than significant without mitigation.

Threshold 2:	*Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.*

Impact HAZ-4 Residential development on the project site would not occur near roadways on which accidents that involve hazardous materials could occur. In addition, required adherence to existing Federal and State laws and regulations would limit the potential for release of hazardous materials due to upset and accident conditions. Impacts would be Class III, *less than significant* level.

The site is bounded by Val Verde Drive to the east, which is a private, dead-end road that is not regularly used by commercial transportation vehicles. The majority of commercial vehicles transporting hazardous materials near the site would utilize Highway 1, located approximately 0.3 mile west of the site, or Carmel Valley Road, located approximately 0.2 mile north of the site. U.S. EPA and U.S. Department of Transportation (DOT) laws and regulations have been promulgated to track and manage the safe interstate transportation of hazardous materials and waste. U.S. EPA administers permitting, tracking, reporting, and operations requirements established by RCRA. DOT regulates the transportation of hazardous materials through implementation of the Hazardous Materials Transportation Act. This act administers container design, and labelling and driver training requirements. State and local agencies enforce the application of these acts and provide coordination of safety and mitigation responses in the case that accidents involving hazardous materials occur. Enforcement of these acts and rapid response by local agencies would ensure that hazards to the public or environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment are less than significant.

Mitigation Measures. No mitigation is required.

Significance After Mitigation. Impacts would be less than significant without mitigation.

Threshold 3:	*Emit hazardous emissions or handles hazardous or acutely hazardous materials, substances or waste within one-quarter mile of an existing or proposed school.*

Impact HAZ-5 The proposed project could result in the temporary emission of hazardous materials, substances or waste within one-quarter mile of an existing school. However, compliance with existing regulations would ensure that impacts remain Class III, *less than significant*.

Carmel Middle School is located approximately 500 feet east of the northeastern corner of the site. During construction of the proposed project, minor amounts of potentially hazardous materials such as fuels, lubricants, and solvents could be used. However, the transport, use, and storage of hazardous materials during construction would be conducted in accordance with all applicable state and federal laws, including the Hazardous Materials Transportation Act,

Resource Conservation and Recovery Act, the California Hazardous Material Management Act, and the California Code of Regulations, Title 22. Adherence to these requirements would reduce construction phase impacts to a less than significant level.

The proposed residential project would not emit any hazardous materials during operation. Therefore, the project would not result in hazardous emissions or waste within the vicinity of an existing school. Impacts would be less than significant.

Mitigation Measures. No mitigation is required.

Significance After Mitigation. Impacts would be less than significant without mitigation.

Threshold 7:	*Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.*

Impact HAZ-6 The project site is not located in an area subject to a high fire threat, and new development located on the project site would be required to comply with existing regulations intended to minimize the potential effects associated with wildfires. Impacts related to exposing people or structures to a significant risk of loss, injury, or death involving wildland fires would be Class III, *less than significant*.

The project site is not located in a fire hazard severity zone as mapped by CAL FIRE. Furthermore, the proposed project would be designed to protect structures from through required compliance with applicable standards set forth the Fire Code, CBC, the Carmel Valley Master Plan, Monterey County General Plan Safety Element, and the Monterey County's Emergency Operations Plan. Standards would include automatic fire protection systems, such as fire breaks, fire-retardant building materials, automatic fire sprinkler systems, and/or water storage tanks. As discussed in Section 4.12, *Public Services and Recreation*, all road widths and circulation, as well as the placement of fire hydrants and installation of automatic sprinkler systems, would be designed with the guidance of the Monterey County Regional Fire District. As discussed in Section 4.12, *Public Services and Recreation*, emergency response times would remain adequate with implementation of the proposed project, in the event of a wildfire.

Implementation of standard fire prevention measures and proper site design, as well as compliance with existing codes and ordinances, would ensure that impacts resulting from fire hazards would be less than significant.

Mitigation Measures. No mitigation is required.

Significance After Mitigation. Impacts would be less than significant without mitigation.

c. Cumulative Impacts. Cumulative impacts associated with hazards and hazardous materials are generally site-specific. For cumulative impacts related to the transport, use, and

disposal of hazardous materials, the geographic extent would include construction- and operation-related transportation routes, including Highway 1, Carmel Valley Road, Rio Road, Carmel Rancho Boulevard, and Val Verde Drive.

Development of past, present and reasonably foreseeable future developments could cumulatively increase the potential for exposure of people to hazards and hazardous materials, including those located along the transportation routes to hazardous materials that would be used, transported, or disposed of during construction or operation of future projects. However, as discussed throughout this section, U.S. EPA and U.S. Department of Transportation (DOT) laws and regulations have been promulgated to track and manage the safe interstate transportation of hazardous materials and waste. Enforcement of these laws and regulations and rapid response by local agencies would reduce hazards to the public or environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment to a less than significant level for cumulative development along transportation routes.

Development of past, present and reasonably foreseeable future developments in the vicinity of the site could cumulatively increase the potential for exposure of people to soil contamination, including pesticides and asbestos. This exposure could occur as a result of ground disturbance during construction or from demolition of buildings with asbestos containing materials or lead based paint. The project would incrementally contribute to this cumulative effect. However, as discussed throughout this section, such risks of exposure are substantially reduced through adherence to existing local, State, and Federal laws and regulations. Accordingly, as required under applicable laws and regulations, potential impacts associated with other cumulative developments would be addressed on a case-by-case basis and appropriate mitigation would be designed to mitigate impacts resulting from individual projects, depending upon the type and severity of hazards present. Assuming that all hazards are adequately addressed for each individual development proposal, cumulative impacts related to hazards and hazardous materials would be less than significant.

Development of past, present and reasonably foreseeable future developments could cumulatively increase the potential for exposure of people along the transportation routes to hazards associated with emergency evacuation plans. Such hazards could result from issues with compliance with the County's emergency response and/or evacuation plans because of the addition of residents and employees in areas without adequate emergency access. The project does not conflict with any such plans and would provide appropriate access and evacuation routes for residents. Future projects would be assessed on a case-by-case basis to ensure that any emergency response and/or evacuation plans would not be negatively impacted by development. Therefore, cumulative impacts would be less than significant.

Development of past, present and reasonably foreseeable future developments could cumulatively increase the potential for exposure of people in the area to wildland fire hazards from development in a fire hazard severity zone. The proposed project would not locate residents in a fire hazard severity zone and would not contribute to this cumulative impact, and cumulative impacts in this regard would be less than significant.

4.8 HYDROLOGY AND WATER QUALITY

4.8.1 Summary

Table 4.8-1 summarizes the identified environmental impacts, proposed mitigation measures, and residual impacts of the proposed project with regard to hydrology and water quality. Additional detail is provided in Section 4.8.3 (Impact Analysis).

Table 4.8-1
Impact and Mitigation Summary: Hydrology and Water Quality

Impact	Mitigation Measures	Residual Impact
Impact H-1 Construction of the proposed project could potentially result in an increase in pollutant discharges to waters of the State, but compliance with Monterey County 2010 General Plan and Carmel Valley Master Plan policies, as well as existing regulatory requirements, would help to reduce or avoid such impacts. Mitigation to reduce off-site runoff to the maximum extent feasible would ensure that the proposed project would not violate water quality standards or waste discharge requirements or otherwise degrade water quality. This impact would be Class II, significant but mitigable.	**H-1(a) Accidental Spill Control and Environmental Training**. Prior to the issuance of a grading permit, the applicant shall submit a Spill Response Plan and Spill Prevention, Control and Countermeasure Plan to the County of Monterey for review and approval. The Spill Response Plan (SRP) in combination with the Spill Prevention, Control and Countermeasure (SPCC) Plan to be prepared for the proposed project shall include procedures for quick and safe clean-up of accidental spills. The SRP and/or SPCC shall prescribe hazardous materials handling procedures for reducing the potential for a spill during construction, and shall include an emergency response program to ensure quick and safe clean-up of accidental spills. Additionally, an environmental training program shall be established to communicate environmental concerns and appropriate work practices, including spill prevention and response measures to all field personnel. A monitoring program shall be implemented to ensure that the plans are followed during all construction activities. **H-1(b) Maintain Vehicles and Equipment**. All vehicles and equipment, including all hydraulic hoses, shall be maintained in good working order to minimize leaks that could escape the vehicle or contact the ground. A vehicle and equipment maintenance log shall be updated and provided by the applicant to the County of Monterey RMA – Planning Department on a monthly basis for the duration of project construction.	Implementation of Mitigation Measures H-1(a) through H-1(d) would reduce impacts to a less than significant level.

Table 4.8-1
Impact and Mitigation Summary: Hydrology and Water Quality

Impact	Mitigation Measures	Residual Impact
	H-1(c) Design-level Drainage Analysis and Minimization of Runoff. The applicant shall conduct a design-level drainage analysis prior to issuance of a construction permit that shall identify existing drainage patterns across the project site and existing off-site stormwater discharge locations. The drainage analysis shall quantify, to the extent feasible, the existing and predicted post-construction peak runoff rates and amounts both on-site and off-site immediately downgradient of the project site. The drainage analysis shall identify any changes to the location of down-gradient discharge of stormwater runoff and any potential impacts on off-site property that would result from those changes. Stormwater control measures shall be developed to maximize on-site infiltration of stormwater and minimize off-site stormwater discharge. These stormwater control measures shall be designed to achieve conformance with Monterey County General Plan Safety Element Policy S-3.1 such that post-development, off-site peak flow drainage from the project site would not be greater than pre-development peak flow drainage. The stormwater control measures may include, as necessary, above-ground retention and/or detention basins, stormwater collection tanks, subsurface infiltration devices such as cisterns with permeable bottoms or perforated pipes, permeable pavement, and vegetated swales. The stormwater control measures required by this mitigation may be used, in whole or in part, to satisfy the erosion and runoff control standards of the NPDES-required SWPPP and the Monterey County Code-required erosion control plan. The design-level drainage analysis shall be submitted to and approved by Monterey County RMA – Public Works, Monterey County RMA – Environmental Services, and Monterey County Water Resources Agency prior to issuance of a construction permit. The identified	

Table 4.8-1
Impact and Mitigation Summary: Hydrology and Water Quality

Impact	Mitigation Measures	Residual Impact
	stormwater control measures shall be installed prior to issuance of occupancy permits. **H-1(d) Stormwater Control Plan, Operation and Maintenance Plan, and Maintenance Agreements**. Prior to issuance of construction permits, the applicant shall submit a Stormwater Control Plan, prepared by a registered professional engineer, addressing the Post-Construction Stormwater Management Requirements (PCRs) for Development Projects in the Central Coast Region. The plan shall include the location of the drainage facilities and construction details. A report with supporting calculations shall also be provided. The Stormwater Control Plan shall be reviewed by a licensed Geotechnical Engineer to ensure conformance with the Geotechnical Investigation or Engineering Geology Report. Prior to issuance of construction permits, the applicant shall submit an Operation and Maintenance Plan to RMA Environmental Services for review and approval. The plan shall be prepared by a registered Professional Engineer and include, at a minimum, the following: a) a site map identifying all structural Stormwater Control Measures requiring O&M practices to function as designed, b) O&M procedures for each structural Stormwater Control Measure including, but not limited to, LID facilities, retention/detention basins, and proprietorship devices, and c) the O&M plan shall include short- and long-term maintenance requirements, recommended frequency of maintenance, and estimated cost for maintenance. Prior to issuance of construction permits, the applicant shall enter into a Maintenance Agreement (Agreement) with Monterey County. The applicant shall submit a signed and notarized agreement to RMA Environmental Services for review and approval. The agreement shall clearly identify the responsible party for ongoing maintenance of structural Stormwater Control Measures. The	

Table 4.8-1
Impact and Mitigation Summary: Hydrology and Water Quality

Impact	Mitigation Measures	Residual Impact
	Agreement shall contain provisions for an annual report to be prepared by a registered Professional Engineer. The annual report shall be submitted to RMA Environmental Services, for review and approval, no later than August 15th. All recommended maintenance shall be completed by October 15th of that same year. If maintenance is required, certification shall be provided that all recommended maintenance has been completed before the start of the rainy season.	
Impact H-2 Net consumptive use of groundwater for the proposed project would be less than the baseline consumptive use and would not result in a net deficit in aquifer volume or a lowering of the local groundwater table level. Sufficient water supplies are available to serve the project from existing entitlements and resources. Impacts would be Class III, less than significant.	No mitigation is required.	Impacts would be less than significant.
Impact H-3 Construction and operation of the proposed project would alter the on-site topography and increase the amount of on-site impervious surface, which could increase the rate and amount of on- and off-site runoff and result in erosion, flooding, and the need for expanded stormwater drainage facilities. Compliance with existing regulations and policies would help to reduce or avoid such impacts. Mitigation to reduce off-site runoff to the maximum extent feasible would ensure that the proposed project would not result in on- or off-site erosion or flooding or the need for expanded stormwater drainage facilities. This impact would be Class II, significant but mitigable.	Mitigation Measure H-1(c) would ensure that the amount and rate of on- and off-site stormwater runoff would be reduced to the maximum extent feasible. No additional mitigation is required.	Implementation of Mitigation Measure H-1(c) would reduce impacts to a less than significant level.
Impact H-4 Construction and operation of the proposed project would place housing within a 100-year flood hazard area which could result in the impedance or redirection of flood flows and the exposure of people and structures to a significant risk of loss, injury, or death involving flooding. Project design features would help to reduce flood risk. Mitigation would further reduce the risk of loss, injury, or death involving	Mitigation Measure H-1(c), combined with Mitigation Measure H-4 below, are required to ensure that on-site structures and people are protected from a significant risk of loss, injury, or death involving flooding and to ensure that the amount and rate of on- and off-site stormwater runoff would be reduced to the maximum extent feasible. **H-4 Protect Project Structures and**	Implementation of Mitigation Measures H-1(c) and H-4 would reduce impacts to a less than significant level.

Table 4.8-1
Impact and Mitigation Summary: Hydrology and Water Quality

Impact	Mitigation Measures	Residual Impact
flooding. This impact would be Class II, *significant but mitigable*.	**Residents from Flood-related Loss, Injury, or Death.** The applicant shall design the project and all on-site structures in a manner that reduces the exposure to loss, injury, or death involving flooding to the maximum extent feasible. Prior to issuance of grading permits, the applicant shall submit a description of proposed flood control measures for review and approval. Measures can include on-site improvements, off-site improvements, or a combination of on- and off-site improvements. Examples of on-site improvements include: • Raising building foundations above the base flood elevation • Designing roadways in such a way that they serve as effective levees • Providing on-site flood capture systems that would intercept and infiltrate flood flows up-gradient of all on-site structures • Providing on-site drainage facilities to route flood flows around project structures (provided that those on-site drainage facilities do not result in a post-development discharge of runoff that would exceed pre-development levels) Examples of off-site improvements include: • Contribution to, and confirmation of, concrete plans for the implementation of regional flood mitigation strategies. Examples of regional flood mitigation strategies relevant to the project site include: o Installation of an upstream conduit to capture DA-27 flood flows and route those flows to the Carmel River (extension further to the north of an 84-inch drainage pipe as proposed by the Rancho Canada Village Project would address this requirement) o Raising the elevation of Val Verde Drive sufficiently to protect the project site from	

Table 4.8-1
Impact and Mitigation Summary: Hydrology and Water Quality

Impact	Mitigation Measures	Residual Impact
	the DA-27 overland flows, provided that those re-directed flood flows do not adversely affect off-site properties. In the case where the applicant chooses to contribute to regional flood mitigation strategies, the applicant shall confirm with the County or appropriate resource agency that those improvements would be constructed prior to the issuance of occupancy permits. If the applicant chooses not to contribute to regional flood mitigation strategies, then the applicant must implement one or more of the on-site improvements listed above such that the exposure to loss, injury, or death involving flooding (including project-induced off-site flooding) would be reduced to the maximum extent feasible. The applicant shall submit the proposed flood protection measures to Monterey County RMA – Public Works, Monterey County RMA – Environmental Services, and Monterey County Water Resources Agency for approval prior to issuance of a construction permit. The submittal shall clearly demonstrate that all on-site habitable structures would be raised above the base flood elevation or would be fully protected from DA-27 flood waters produced during the 100-year storm event.	

4.8.2 Setting

a. Regional Hydrology. The project site is located in the Central Coast Hydrologic Region. This region covers approximately 7.22 million acres and includes all of Santa Cruz, Monterey, San Luis Obispo, and Santa Barbara counties, as well as parts of San Benito, San Mateo, Santa Clara, and Ventura counties. Major geographic features that define the region include the Pajaro, Salinas, Carmel, Santa Maria, Santa Ynez, and Cuyama valleys; the coastal plain of Santa Barbara; and the Coast Range. The region is largely defined by the northwest-trending southern Coast Range, with a climate generally classified as Mediterranean. The region is the most groundwater-dependent hydrologic region in California; approximately 80% of the supply in the region is sourced from groundwater (DWR, 2003; MPWMD, 2014).

Within the Central Coast Hydrologic Region the project site is located in the Carmel River Hydrologic Unit between the Santa Lucia and Salinas Hydrologic Units. This hydrologic unit has elevations that range between sea-level at the northwestern end and 4,500 to 5,000 feet near the southeastern headwaters of the Carmel River in the Santa Lucia Mountains (MPWMD, 2014).

Watersheds. The project site is located in the Carmel River Hydrologic Unit (Watershed), a 255 square mile, southeast-northwest trending watershed in the coast ranges of central Monterey County. The Carmel River Watershed drains the Carmel Valley northwestward and feeds into the Carmel River, which meanders for 36 miles in a northwesterly direction merging with seven major stream tributaries until it flows into the Pacific Ocean at Carmel Bay (MPWMD, 2014). The terminus of the Carmel River with the Pacific Ocean is located approximately 0.7 mile northwest of the project site, just south of the City of Carmel-by-the-Sea, in Monterey County.

b. Surface Water. The primary surface water resource in the vicinity of the site is the Carmel River, located approximately 1,050 feet to the south. The Carmel River and its seven main tributaries drain the Carmel Valley northwestward to where it discharges into Carmel Bay (MPWMD 2014). The Carmel River has an average annual runoff of 74,440 acre-feet (AF) for the period of record 1962-2013 (MPWMD 2014); however, due to the weather patterns of the region, surface water supplies can vary substantially year-to-year. There was no flow recorded for a 16-month period at this station during the 1976-77 drought. The highest flow recorded by USGS was 368,000 AF during the 1982-83 El Niño event. Three of the largest flood events in the last 15 years include January 1995, March 1995, and February 1998. Recent drought flows for water year 2014 and 2015 were 12,140 and 13,420 AF, respectively. The most recent water year, 2016, had a flow of 41,710 AF (MPWMD 2016a).Approximately 70 to 80% of the surface runoff in the Carmel River watershed is generated from rainfall within the Los Padres National Forest (MPWMD 2014).

Local drainages contribute to the Lower Carmel River/Lagoon Sub-Watershed of the Carmel River, although they do not convey significant volumes of runoff (The Watershed Institute, 2004). The Carmel River passes approximately 1,050 feet south of the southern boundary of the project site. There are no drainages defined in the National Hydrography Dataset that cross the project site, and a review of recent aerial imagery did not reveal the presence of any defined channels or riparian areas. Surface water that flows across the project site occurs as either overbank flows from the Carmel River or sheet flow from the current downstream end of County Drainage Area 27 (DA-27), a tributary drainage area to the Carmel River (Balance Hydrologics, 2016).

Surface Water Quality. The Monterey Peninsula and its surrounding areas host a range of land uses including residential, commercial, industrial, agricultural, recreational, and open space uses. The Carmel River watershed consists primarily of rural to low-density residential land use, with urban development located near at the mouth of the Valley near the City of Carmel-by-the-Sea. Other land uses include wilderness, viticulture, grazing, recreation, sparse traditional agricultural, suburban residential, commercial and light industrial uses (MPWMD 2014). Similar to many watersheds along the Central Coast of California, commercial and residential development is most dense near the coast and becomes progressively less dense in

the upstream direction of the watershed. Stormwater runoff from urban and agricultural lands can be a source of water quality pollutants, including sediment, heavy metals, bacteria, pesticides, and fertilizers (RWQCB, 2016). Failure to implement Best Management Practices and pollutant control measures can result in water quality degradation for nearby waterbodies (RWQCB, 2016). Impairments to water quality in the Carmel River Watershed and measures to improve water quality and prevent further degradation are discussed below.

The Carmel River Watershed is within the jurisdiction of the Central Coast Regional Water Quality Control Board (RWQCB). The Central Coast RWQCB establishes requirements prescribing the quality of point and nonpoint sources of discharge and establishes water quality objectives through the Water Quality Control Plan for the Central Coastal Basin (Basin Plan). A point source of discharge is defined as waste emanating from a single, identifiable point such as a wastewater treatment plant. A nonpoint source of discharge results from drainage and percolation of agricultural and urban stormwater runoff.

The Basin Plan defines beneficial uses of the Carmel River as municipal and domestic supply, agricultural supply, industrial process supply, groundwater recharge, freshwater replenishment, contact and noncontact recreation, commercial and sport fishing, warm and cold freshwater habitat, migration of aquatic organisms, reproduction and early development of fish, wildlife habitat, preservation of biological habitats of special significance, and support of habitats necessary for the survival and successful maintenance of rare, threatened, or endangered species (RWQCB 2016).

The Central Coast RWQCB assessed the Carmel River for potential pollutants that may impair one or more of its beneficial uses and found that this water body meets applicable water quality standards for the assessed pollutants. Therefore, the Carmel River is not included on the 2012 Clean Water Act Section 303(d) list of impaired water bodies. A tributary to the Carmel River, Tularcitos Creek, is listed on the 2012 303(d) list as impaired by Chloride, Fecal Coliform, and Sodium (SWRCB 2016). A Total Maximum Daily Load (TMDL) is required to address each of these pollutants by none has been developed as of this date. The confluence of Tularcitos Creek and the Carmel River lies upstream of the proposed project site and therefore water quality in Tularcitos Creek would not be affected by proposed project activities. The Pacific Ocean at Stillwater Cove, which is located approximately three miles north of the mouth of the Carmel River, is listed on the 2012 303(d) list as impaired by bacteria (Enterococcus). A TMDL is required to address this pollutant but has not yet been developed. Stillwater Cove is downstream of the proposed project site and water quality in the cove could potentially be affected by project activities.

The Monterey Peninsula Water Management District (MPWMD) has monitored surface-water quality in the Carmel River since 1991. This monitoring is used to help assess whether or not water-quality criteria for aquatic life are being met in various reaches of the Carmel River, and whether habitats for resources such as the South-Central Coast steelhead (*Oncorhynchus mykiss*) and California red-legged frogs (*Rana aurora draytonii*) are being sustained or impaired in the Carmel River (MPWMD 2004). Ambient conditions in surface waters are measured by dissolved oxygen, carbon dioxide, pH, temperature, turbidity, conductivity, and salinity, while groundwater is monitored for specific conductance, total alkalinity, pH, chloride, sulfate,

ammonia nitrogen, nitrate nitrogen, total organic carbon, calcium, sodium, magnesium, potassium, iron, manganese, orthophosphate, and boron.

MPWMD has found that, in general, dissolved oxygen, carbon dioxide, and pH levels in the main stem of the Carmel River meet the Basin Plan objectives set by the Central Coast RWQCB. However, average daily water temperature during the late summer and fall commonly exceeds the range for optimum steelhead growth (50-60°F). Monitoring stations along the river show that water temperature during these months remains in a stressful range and can reach levels that threaten aquatic life (above 70°F). Linear trend analysis of data from the eight-year period between 1996 and 2004 at the Garland Park station, where water temperature annually exceeded 70°F, showed a slight downward trend in maximum daily water temperature. This may have been due to the recovery of the riparian zone upstream and the shade it provides along the river. Additional data collected between 2004 and 2008 continue to show temperatures exceeding objectives, particularly at or downstream of existing reservoirs. Water temperature in winter and spring is frequently in the range that is considered optimal for steelhead growth (MPWMD 2004). A recent study showed a statistically significant downward trend in surface water temperature along the length of the Carmel River during a 16-year period from 1996 to 2011 (MPWMD, 2013).

Turbidity in the main stem of the Carmel River is normally low, except during the winter months when storm runoff events can elevate turbidity for several days during and after a storm event. Very wet years, such as in 1998, can cause extensive landslides and bank erosion, which can increase turbidity in the main stem for up to several months.
The San Clemente Dam was removed in the summer of 2015 as part of habitat restoration efforts along the Carmel River. Removal of the San Clemente Dam will likely help to improve water quality and habitat conditions in the river (CalAm 2016). There are discussions about the potential future removal of Los Padres Dam as well, but its fate is uncertain.

Water quality in the Carmel River Lagoon typically declines during late summer and fall as freshwater inflows cease and a sand bar forms that closes off the mouth of the river. Subsequently, ocean waves start to overtop the sandbar at the mouth of the river. Water temperature often exceeds 70°F, which is above Basin Plan guidelines. Dissolved oxygen levels also periodically drop below guidelines (not less than 7.0 mg/L), probably due to a combination of increasing water temperature and decomposition of marine organic material washed into the lagoon by high ocean waves (MPWMD, 2004.)

The Carmel River Basin watershed discharges into the Pacific Ocean in the Carmel Bay Area of Special Biological Significance (ASBS), a 6.2 mile section of the coastline bordering the City of Carmel-by-the-Sea which was designated by the State Water Resources Control Board (SWRCB) as requiring protection (SWRCB 2014a). The Carmel Bay ASBS is contained within the federally protected Monterey Bay National Marine Sanctuary (MBNMS), which runs 276 miles from Marin County in the north to northern San Luis Obispo County in the south and extends an average of 30 miles offshore. The Carmel Bay State Marine Conservation Area (SMCA) and a portion of the Carmel Pinnacles State Marine Reserve (SMR) are contained within the Carmel Bay ASBS. The Carmel Bay ASBS is affected by various types of runoff, including storm-water runoff from local watersheds that enters the bay from the Carmel Valley, City of Carmel-by-the-

Sea, and the Pebble Beach area watersheds (County of Monterey 2014). Runoff leaving the proposed project site would enter the Carmel River and travel to the Carmel Bay. Any pollutants carried by this runoff could affect water quality in the bay. No water quality data are available for runoff from the project site. Surface water quality in the project area is directly affected by stormwater runoff from adjacent streets and properties. Pollutants potentially present in this stormwater runoff include fertilizers, pesticides, metals, hydrocarbons, trash, and bacteria.

c. Groundwater. The project site overlays the Carmel Valley Alluvial Aquifer (CVAA; also referred to as the Carmel Valley Groundwater Basin by the California Department of Water Resources [DWR]). The CVAA has a surface area of approximately 5,160 acres, or eight square miles (DWR 2004). This area has been defined by MPWMD and SWRCB as the water-bearing strata directly associated with the Carmel River (MPWMD 2014). The groundwater basin consists of younger alluvium and river deposits, and older alluvium and terrace deposits. These deposits are underlain by Monterey Shale and Tertiary sandstone units. The primary water bearing formation is the younger alluvium with a typical thickness of 50 to 100 feet. The younger alluvium consists of boulders, gravel, sand, silt, and clay. The thickness varies from approximately 30 feet in the upper basin to about 180 feet near the mouth of the basin (DWR 2004). The Carmel River is the primary source of recharge for the basin contributing approximately 85% of net recharge (DWR 2004).

Groundwater Quality. The Basin Plan defines the beneficial uses of groundwater in the CVAA as agricultural water supply (AGR), municipal and domestic water supply (MUN), and industrial use (IND). The Basin Plan established water quality objectives for groundwater (including the CVAA) for bacteria, chemical constituents, organic chemicals, radioactivity, and tastes and odors (RWQCB 2016). Groundwater quality constituents of concern in the CVAA are nitrates from septic tanks, iron, and manganese (DWR 2003). MPWMD has maintained a groundwater-quality monitoring program in the Carmel Valley Aquifer since 1981. The sampling schedule for Carmel Valley is staggered, with upper valley wells sampled in spring and lower Carmel Valley wells in fall, to coincide with the historically higher nitrate concentrations in these respective areas. MPWMD is particularly interested in tracking indicators of potential seawater intrusion in the coastal portion of Carmel Valley. Test wells near the Carmel Bay show there is a slight increasing trend in Specific Electrical Conductance (SEC) and Chloride from 2008 to 2015, after a noticeable decline from 2006 to 2008. Testing 6.72 miles from the river mouth show both an increasing trend in SEC and Chloride from 2008 to 2011, after a noticeable decline from 2006 to 2008, but in 2012 both constituents were lower than in 2011 (MPWMD 2016). Groundwater withdrawals for water supply in the lower portion of the basin must be treated for iron and manganese prior to distribution (DWR 2003; as cited in Monterey County 2016).

Drinking water quality is regulated by the EPA through the establishment and regulation of Maximum Contaminant Levels (MCLs). Water quality at the primary water supply well for the proposed project, the Gamboa Replacement well, met all primary drinking water standards when it was tested in 2008, except that it tested positive for coliform bacteria (Bierman Hydrogeologic, 2009a; Marks, 2009). Bacteria can generally be eliminated by disinfecting the well and do not represent a long-term water-quality issue. Two constituents regulated under secondary drinking water standards that reflect aesthetics and consumer acceptability greatly

exceeded the secondary MCLs: iron and manganese (Todd Groundwater, 2016). Elevated concentrations of these minerals are common in Central Coast groundwater basins, and they are usually remedied by treatment at the wellhead (Todd Groundwater, 2016).

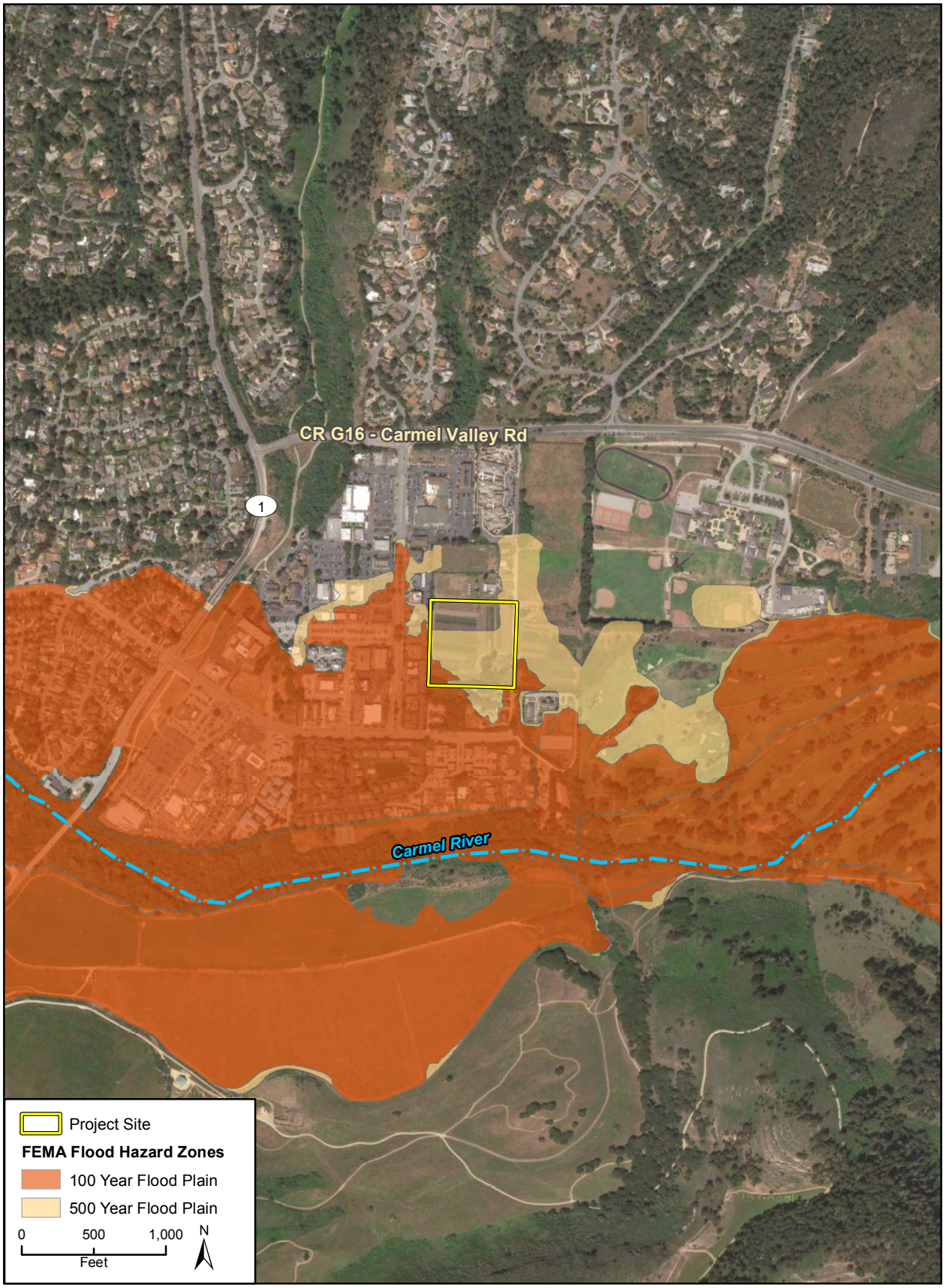
Groundwater Levels. Although the storage capacity for the CVAA is not known with certainty, estimates range from 36,000 to 60,000 acre-feet (DWR, 2004). The Carmel River is the primary source of recharge for the CVAA, constituting approximately 85% of the net recharge (DWR, 2004). Due to groundwater pumping by private well owners and California American Water (CalAm) during the spring and summer, the Carmel River commonly does not flow to the ocean during the summer and fall. The lower six miles of the river is dewatered during normal years and runs dry up to nine miles from its terminus during dry years (MPWMD 2014). Consequently, the SWRCB issued orders against CalAm to reduce pumping from the Carmel River Basin (SWRCB WRO 95-10 and WRO 2009-0060).

Groundwater levels in the CVAA recover rapidly with the presence of surface water and range from 5 to 30 feet below ground surface (bgs) when the basin is fully recharged (DWR, 2004). Groundwater levels typically fluctuate between 5 and 15 feet during normal years and can experience declines up to 50 feet during drought years (DWR, 2004). The CVAA has not been declared to be in overdraft (Todd Groundwater, 2016). Groundwater levels still recover to a "full" level by the end of winter in most years (Todd Groundwater, 2016). However, groundwater extractions during the rest of the year deplete Carmel River base flow and adversely impact fish (Todd Groundwater, 2016).

d. Flood Hazards.

FEMA Flood Hazard Zones. The Federal Emergency Management Agency (FEMA) establishes base flood heights for the 100-year flood zone and the 500-year flood zone. The 100-year flood zone is defined as the area that could be inundated by the flood which has a 1% probability of occurring in any given year, or once every 100 years. The 500-year flood zone is defined as the area that could be inundated by the flood which has a 0.2% probability of occurring in any given year, or once in 500 years. The majority of the project site is not located in a 100-year flood zone. As shown in Figure 4.8-1, the lower southwestern portion of the site does fall within the 100-year flood zone. The primary source of this flood hazard is overbank flows from the main stem of the Carmel River due to channel overtopping east of Val Verde Drive and, to a lesser extent, along the Riverwood Townhomes (Balance Hydrologics, 2016). Over half the site falls within the 500-year flood zone (FEMA 2016).

Overland flow from County Drainage Area 27 (DA-27) currently results in shallow flooding on-site (generally less than one foot in depth), but this flood risk does not appear to comprise a substantial component of the FEMA-identified 100-year floodplain. Flooding associated with DA-27 generally flows in a southwesterly direction across the project site towards the Carmel River. This runoff originates in the foothills of the valley wall north of the Carmel River. Flow paths within DA-27 are well-defined in the steep canyons north of Carmel Valley Road, but disappear into an alluvial plain with sheet flow north of the project site (Balance Hydrologics, 2016). The extent of and potential solutions to the DA-27 flooding were studied in the County Service Area 50 Final Lower Carmel River Stormwater Management and Flood Control Report (Balance Hydrologics, 2014). Recommended options to address flooding associated with DA-27



Imagery provided by Google and its licensors © 2016; Additional data provided by FEMA, 2015.

FEMA Flood Map

Figure 4.8-1

include the construction of perimeter protection (levees) and conveyance of DA-27 runoff via pipeline to the Carmel River. Measures to address existing on-site flooding from DA-27 runoff and potential changes to off-site flooding due to construction and operation of the proposed project are discussed below in Section 4.8.3, Impact Analysis.

The site is not susceptible to flooding due to the failure of a dam. The Los Padres Dam is the nearest dam, located approximately 23 miles to the southwest of the project. The storage capacity of the Los Padres Reservoir has been reduced due to sedimentation from its original capacity of 3,130 acre-feet to its current capacity of approximately 1,785 acre-feet. Even if the Los Padres Dam were to fail when the reservoir was full, the amount of water that would be released would not result in substantial flooding at the project site, which lies more than 20 miles downstream of the dam. Peak flow in the Carmel River near the project site following failure of the Los Padres Dam would be substantially less than the FEMA estimated 100-year flood event peak flow of 23,300 cubic feet per second (cfs). The failure of existing non-accredited levees that run southeast of the project site, roughly parallel to Val Verde Drive, could increase the on-site flood risk during a 100-year flood event. However, due to the orientation of these levees relative to the project site, their failure would likely result in increased flood risk for property to the south and west of the project site rather than for the project site itself.

Tsunami and Seiche. A tsunami is a series of waves generated by an impulsive disturbance in the ocean or in a small, connected body of water. Tsunamis are produced when movement occurs on faults in the ocean floor, usually during very large earthquakes. Sudden vertical movement of the ocean floor by fault movement displaces the overlying water column, creating a wave that travels outward from the earthquake source. An earthquake anywhere in the Pacific can cause tsunamis around the entire Pacific basin. Since the Pacific Rim is highly seismically active, tsunamis are not uncommon.

A seiche is a standing wave oscillating in a body of water and may occur in any enclosed or semi enclosed bodies of water such as bays and lakes. Seiches are typically caused by strong wind and rapid changes in atmospheric pressure. They can also form along ocean shelves and harbors due to earthquakes, tsunamis, or severe storm fronts.

The outlet of the Carmel River and Carmel Valley is susceptible to tsunamis and seiches due to its location along the Pacific Coast and within Carmel Bay. According to the Tsunami Inundation Map for Emergency Planning for the Monterey Quadrangle, a tsunami could inundate up to 0.6 mile inland from the mouth of the Carmel River (California Emergency Management Agency [CEMA] 2009; as cited in Monterey County 2015).The project site is located approximately 1.4 miles east of the shoreline with an elevation of approximately 34 feet above mean sea level (amsl). Therefore, the site is not located in tsunami hazard area. Also, no enclosed waterbodies are located near the project site and therefore the site would not be subject to inundation by seiche.

e. Regulatory Setting.

Federal.

Federal Clean Water Act. In 1972, Congress passed the Federal Water Pollution Control Act, commonly known as the Clean Water Act (CWA), with the goal of "restor[ing] and maintain[ing] the chemical, physical, and biological integrity of the Nation's waters." 33 U.S.C. § 1251(a). The CWA directs states to establish water quality standards for all "waters of the United States" and to review and update such standards on a triennial basis. Section 319 mandates specific actions for the control of pollution from non-point sources. The EPA has delegated responsibility for implementation of portions of the CWA, including water quality control planning and control programs, such as the National Pollutant Discharge Elimination System (NPDES) Program, to the SWRCB and the RWQCBs.

Section 303(c)(2)(b) of the CWA requires states to adopt water quality standards for all surface waters of the United States based on the water body's designated beneficial use. Water quality standards are typically numeric, although narrative criteria based upon biomonitoring methods may be employed where numerical standards cannot be established or where they are needed to supplement numerical standards. Water quality standards applicable to the project are contained in the Basin Plan (Central Coast RWQCB, March 2016).

Section 303(d) of the CWA bridges the technology based and water quality-based approaches for managing water quality. Section 303(d) requires that states make a list of waters that are not attaining standards after the technology-based limits are put into place. For waters on this list (and where the USEPA administrator deems they are appropriate), states are to develop "total maximum daily loads" (TMDL). TMDLs are established at the level necessary to implement the applicable water quality standards. A TMDL must account for all sources of the pollutants that caused the water to be listed. Carmel River near the project site is not an impaired water body and is not subject to any TMDLs.

Section 404 of the CWA prohibits the discharge of any pollutants into "waters of the United States," except as allowed by permit. 33 C.F.R. § 328.3(a)(3). Section 404 of the CWA authorizes the U.S. Army Corps of Engineers (Corps) to issue permits for and regulate the discharge of dredged or fill materials into wetlands or other waters of the United States. Under the CWA and its implementing regulations, "waters of the United States" are broadly defined to consist of rivers, creeks, streams, and lakes extending to their headwaters, including adjacent wetlands.

National Pollution Discharge Elimination System (NPDES). The goal of the NPDES nonpoint source regulations is to improve the quality of stormwater discharged to receiving waters to the "maximum extent practicable" through the use of best management practices (BMPs). The NPDES permit system was established in the CWA to regulate point source discharges (a municipal or industrial discharge at a specific location or pipe) and certain types of diffuse discharges, including urban stormwater and construction site runoff.

The SWRCB permits all regulated construction activities under NPDES General Permit for Storm Water Discharges Associated with Construction Activity (adopted September 2, 2009)

(the "Construction General Permit"). Every construction project that disturbs one or more acres of land surface or that are part of a common plan of development or sale that disturbs more than one acre of land surface would require coverage under this Construction General Permit. To obtain coverage under this Construction General Permit, the landowner or other applicable entity must file Permit Registration Documents (PRDs) prior to the commencement of construction activity, which include a Notice of Intent (NOI), Storm Water Pollution Prevention Plan (SWPPP), and other documents required by the Construction General Permit, and mail the appropriate permit fee to the SWRCB. Since the proposed project would disturb more than one acre, construction of the project would be subject to these Construction General Permit requirements.
Construction activities subject to the Construction General Permit include clearing, grading, and disturbances to the ground, such as stockpiling or excavation, that result in soil disturbances of at least one acre of total land area. The SWPPP has two major objectives: (1) to help identify the sources of sediment and other pollutants that affect the quality of stormwater discharges; and (2) to describe and ensure the implementation of Best Management Practices (BMPs) to reduce or eliminate sediment and other pollutants in stormwater as well as non-stormwater discharges. BMPs are intended to reduce impacts to the Maximum Extent Practicable (MEP).

State.

Porter-Cologne Water Quality Act. The Porter-Cologne Water Quality Control Act establishes the SWRCB and each RWQCB as the principal State agencies for coordinating and controlling water quality in California. Specifically, the Porter-Cologne Act authorizes the SWRCB to adopt, review, and revise policies for all surface waters and groundwater of the State and directs the RWQCBs to develop regional Basin Plans.

The Central Coast RWQCB has the authority to implement water quality protection standards through the issuance of permits for discharges to waters in its jurisdiction. As described previously, water quality objectives for receiving waters within Monterey County are specified in the Basin Plan prepared by the Central Coast RWQCB in compliance with the federal CWA and the State Porter Cologne Act. The principal elements of the Basin Plan are a statement of beneficial water uses protected under the plan; water quality objectives necessary to protect the designated beneficial water uses; and strategies and time schedules for achieving the water quality objectives. Together, narrative and numerical objectives define the level of water quality that shall be maintained in the region. The water quality objectives are achieved primarily through the establishment and enforcement of waste discharge requirements (WDRs).

The RWQCBs have primary responsibility for issuing WDRs. The RWQCBs may issue individual WDRs to cover individual discharges or general WDRs to cover a category of discharges. WDRs may include effluent limitations or other requirements that are designed to implement applicable water quality control plans, including designated beneficial uses and the water quality objectives established to protect those uses and prevent the creation of nuisance conditions. Violations of WDRs may be addressed by issuing Cleanup and Abatement Orders (CAOs) or Cease and Desist Orders (CDOs), assessing administrative civil liability, or seeking imposition of judicial civil liability or judicial injunctive relief.

State Water Resources Control Board Order WR 2016-0016. In 1995 the State Water Resources Control Board (SWRCB) adopted WR 95-10, which found that CalAm was diverting more water from the Carmel River than they were allocated. WR 95-10 ordered them to decrease their water diversion to their legally allocated amount. In 2009 the SWRCB issued a cease and desist order (CDO) (WR 2009-0060) against CalAm because they had continued to draw 10,730 acre feet annually, which is 7,150 acre feet more than they are allocated, for the 13 years after WR 95-10 was adopted. As a result of the CDO, CalAm would have to decrease the amount of water diverted from the Carmel to 3,376 acre-feet by 2016. This is a 70% reduction in the amount of water diverted from 2009 to 2016. That reduction target was based on the assumption that a regional desalination plant would be built, enabling the area's municipal water needs to be met by new water supplies. It subsequently became clear that no desalination plant will be in operation by the end of 2016, and Cal-Am proposed modifying the compliance schedule to accommodate the anticipated pace of approval and implementation of several proposed water supply and conservation projects. The adopted Order WR 2016-0016 sets water supply and conservation project milestones, an effective diversion limit of 8,310 acre-feet per annum (afa) through December 31, 2021, and effective diversion limit penalties for failure to achieve water supply milestones.

Central Coast Regional Water Quality Control Board Resolution No. R3-2013-0032. The Central Coast RWQCB adopted post-construction requirements that municipal stormwater permittees must apply to new development and redevelopment projects, including new residential subdivisions, to protect the beneficial uses of waters of the State. The performance requirements include site design and runoff reduction measures, water quality treatment measures, stormwater control plan requirements, runoff retention requirements, and peak runoff management requirements.

Local.

Monterey County 2010 General Plan. The Monterey County General Plan contains numerous policies related to hydrology and water quality. For example, Open Space Policy 3.3 requires evaluation and design components to minimize and avoid potential hazards related to drainage, water quality and stream stability associated with new development and changes in land use designations. Other applicable policies require direct and indirect discharges of harmful substances into waterbodies to remain below state and federal standards (Policy OS 4.2). The Safety Element requires BMPs to protect groundwater and surface water quality, to ensure conformance with floodplain development standards, and to maintain and mitigate post-construction peak-flow drainage impacts. The Public Services Element requires the provision of adequate public facilities and services (including an adequate water supply and adequate stormwater drainage systems), the implementation of measures to minimize runoff and enhance groundwater recharge, and the demonstration of a long-term sustainable water supply. Consistency with specific hydrology and water quality policies that apply to the project is provided in Section 4.9, *Land Use.*

Carmel Valley Master Plan. The project site is located within unincorporated Monterey County in the Carmel Valley Master Plan (CVMP) area. Applicable CVMP policies related to hydrology and water quality include requirements that: construction activities reduce potential

erosion by limiting the amount of land cleared at any one time; development incorporate designs with water reclamation, conservation and new source production; not create adverse impacts on groundwater quality or quantity; and not impact the flow or vegetation of the Carmel River. Consistency with specific hydrology and water quality policies that apply to the project is provided in Section 4.9, *Land Use.*

Monterey County Code, Chapter 16.98, Grading. Chapter 16.08 of the Monterey County Code regulates grading activities. The purpose of these regulations is to minimize erosion, protect fish and wildlife, and to otherwise protect the environment. A grading permit is required for all activities that would exceed 100 cubic yards of grading. Where grading operations obstruct and/or otherwise impair the flow or runoff of a drainage course, appropriate drainage facilities are required to be implemented to convey flows past the point of obstruction (§16.08.330). Chapter 16.08 also contains measures to protect water quality from grading related activities and associated erosion. These requirements are codified in §16.08.340 of the Monterey County Code, which requires that all areas disturbed in connection with grading related activities shall be consistently maintained to control erosion. The project would be required to comply with these requirements.

Monterey County Code, Chapter 16.12, Erosion Control. Chapter 16.12 of the Monterey County Code requires that development activities control runoff to prevent erosion. An erosion control plan is required to be submitted to the County of Monterey prior to any land disturbing activities (§16.12.060). This plan is required to indicate methods to control erosion. Runoff control must be implemented to control runoff from a 10-year storm event (§16.12.070). All runoff must be detained or dispersed so that the runoff rate does not exceed the pre-development level. Any concentrated runoff which cannot be effectively detained or dispersed without causing erosion is to be carried in non-erodible channels or conduits to the nearest drainage course designated for such purpose or to on-site percolation devices with appropriate energy dissipaters to prevent erosion at the point of discharge. Runoff from disturbed areas must be detained or filtered by berms, vegetated filter strips, catch basins, or other means as necessary to prevent the escape of sediment from the disturbed area. The project would be required to comply with these requirements.

Monterey County Code, Chapter 16.14, Urban Stormwater Quality Management and Discharge Control. Chapter 16.14 of the Monterey County Code contains regulations to enhance watercourses within the unincorporated urbanized areas of Monterey County by, amongst other things, controlling the entry of urban pollutants into stormwater runoff that may enter the County storm drain system. This chapter assures consistency with the Clean Water Act and the State stormwater general permit and applies to all dischargers or potential dischargers that discharge into the County storm drain system, with the exception of agriculture. To protect stormwater quality, this chapter prohibits specific discharges and conditions, and establishes requirements for containment and notification of spills. Further, this chapter gives the County authority to conduct inspections and established requirements for reporting potential violations.

Monterey County Code, Chapter 16.16, Flood Control and Floodplain Management. Chapter 16.16 of the Monterey County Code contains regulations for floodplains. This chapter discusses

general and specific standards to prevent flood damage and applies to all development in Special Flood Hazard Areas identified on FEMA Flood Insurance Rate Maps (FIRMs). These requirements apply to all areas within the 100-year floodplain, as well as areas within 200 feet of a river or 50 feet of a water course. County Code §16.16.050(k) requires a setback of 200 feet from the top of the bank of a river and 50 feet from the top of the bank of a watercourse. Encroachment within these setbacks is prohibited unless it can be proven that: 1) the proposed development would not significantly reduce the capacity of existing rivers or watercourses or otherwise adversely affect any other properties by increasing stream velocities or depths, or diverting the flow; and 2) the proposed new development would be safe from flow related erosion and would not cause flow related erosion hazards or otherwise aggravate flow erosion hazards.

4.8.3 Impact Analysis

a. Methodology and Significance Thresholds. This section describes the potential environmental impacts of the proposed project relevant to hydrology and water quality. The impact analysis is based on an assessment of baseline conditions for the proposed project area, including climate, topography, watersheds and surface waters, groundwater, and floodplains, as described in Section 4.8.2 (Setting). This analysis identifies potential impacts based on the predicted interaction between the affected environment and construction and operation of the proposed project. This section describes impacts in terms of location, context, duration, and intensity, and recommends mitigation measures, when necessary, to avoid or minimize impacts. This evaluation is based in part on the *Review of Stormwater Management and Flood Control Issues at the Carmel Rio Road Project, County of Monterey* ("*Stormwater Review*") prepared for the project by Balance Hydrologics, Inc. (August 2016; Appendix G), and the *Carmel Rio Road EIR – Groundwater Supply Technical Report* ("*Groundwater Report*") prepared for the project by Todd Groundwater (August, 2016; Appendix G).

In accordance with Appendix G of the *State CEQA Guidelines*, impacts would be significant if the proposed project would result in any of the following:

1. Violate any water quality standards or waste discharge requirements;
2. Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level;
3. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site;
4. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;
5. Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;
6. Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects;

7. Otherwise substantially degrade water quality;
8. Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map;
9. Place within a 100-year flood hazard area structures which would impede or redirect flood flows;
10. Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam;
11. Be subject to inundation by seiche, tsunami, or mudflow; and/or
12. Have insufficient water supplies available to serve the project from existing entitlements and resources, such that new or expanded entitlements are needed.

It should be noted that the project site would not be subject to inundation by seiche, tsunami, or mudflow. The potential for inundation of the project site by seiche or tsunami is discussed above in Section 4.8.2 (Setting). These potential impacts were found to be not relevant to the proposed project site and therefore are not discussed further in this section. The potential impacts of mudflow on the project site are discussed in Section 4.6, *Geology and Soils*. Stormwater drainage improvements and requirements associated with implementation of the proposed project are discussed below under Threshold 6 and also referenced in Section 4.15, *Utilities and Service Systems*. Further discussion regarding Threshold 11 can be found in Section 4.16, *Effects Found not to be Significant.*

b. Project Impacts and Mitigation Measures.

Threshold 1:	*Violate any water quality standards or waste discharge requirements.*
Threshold 7:	*Otherwise substantially degrade water quality.*

Impact H-1 **Construction of the proposed project could potentially result in an increase in pollutant discharges to waters of the State, but compliance with Monterey County 2010 General Plan and Carmel Valley Master Plan policies, as well as existing regulatory requirements, would help to reduce or avoid such impacts. Mitigation to reduce off-site runoff to the maximum extent feasible would ensure that the proposed project would not violate water quality standards or waste discharge requirements or otherwise degrade water quality. This impact would be Class II, *significant but mitigable*.**

Construction. Construction of the proposed project would include grading and fill activities, road improvements, installation and potential realignment of utilities, demolition of an existing single-family residence, construction of housing units, and construction and/or improvement of drainage facilities. The topography of the site, the amount of soil disturbance, the duration that disturbed soil would be exposed, the amount of rainfall and wind that would occur during construction, and the proximity of the nearest waterbody all affect the potential for water quality degradation during construction.

Construction of the proposed project could result in soil erosion due to earth-moving activities such as excavation and trenching for foundations and utilities, soil compaction and moving, cut

and fill activities, and grading. Although the project site is generally flat, runoff from DA-27 occurs as sheet flow and flood depths can reach approximately one foot. This amount of runoff has the potential to result in substantial amounts of erosion, resulting in off-site sediment transport via stormwater. The types of pollutants contained in runoff from construction sites would be typical of urban areas, and may include sediments and contaminants such as oils, fuels, paints, and solvents. Additionally, other pollutants, such as nutrients, trace metals, and hydrocarbons, can attach to sediment and be transported downstream to the Carmel River and ultimately into the Pacific Ocean, contributing to degradation of water quality.

Construction of the proposed project could potentially result in the accidental release of hazardous materials such as diesel fuel, gasoline, lubricant oils, hydraulic fluid, antifreeze, transmission fluid, cement slurry, and other fluids required for the operation of construction vehicles or equipment. Motorized equipment used at the project site during construction could also leak the previously described hazardous fluids due to inadequate or improper maintenance, unnoticed or unrepaired damage, improper refueling, or operator error. These accidentally released or leaked hazardous materials could directly or indirectly impact water quality. Direct contamination of surface water is unlikely because no defined stream channels or perennial waters are present on the project site; the closest waterbody to the project site is the Carmel River, which is located approximately 1,100 feet south of the project site. However, accidental spills or releases of hazardous materials could indirectly impact water quality through runoff during a subsequent storm event, when the spilled material could come in contact with or be washed into flowing water. Similarly, groundwater could be contaminated through direct or indirect contact with potentially harmful or hazardous materials.

Because construction of the proposed project would disturb one or more acres of land surface, it would be subject to the NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Order No. 2012-0006-DWQ) adopted by the SWRCB. Compliance with the permit requires each qualifying development project to file a Notice of Intent with the SWRCB. Permit conditions require development of a SWPPP, which must describe the site, the facility, erosion and sediment controls, runoff water quality monitoring, means of waste disposal, implementation of approved local plans, control of construction sediment and erosion control measures, maintenance responsibilities, and non-stormwater management controls. Inspection of construction sites before and after storms is also required to identify stormwater discharge from the construction activity and to identify and implement erosion controls, where necessary.

Implementation of the required SWPPP would reduce the potential for accidentally released or leaked hazardous materials to contaminate a waterbody following a storm event. Implementation of mitigation to develop a spill response plan and an environmental training program and to properly maintain vehicles and equipment would further reduce the risk of water quality degradation through the accidental release or leak of hazardous materials.

The proposed project would involve more than 100 cubic yards of grading and would require a grading permit and an erosion control plan in accordance with Monterey County Code. The grading permit includes requirements to consistently maintain the construction site to control erosion. The erosion control plan requires control of runoff from a 10-year storm event, and all runoff must be detained or dispersed so that the runoff rate does not exceed the pre-

development level. Concentrated runoff that would result in erosion must be directed via non-erodible channels (such as a storm drainage pipe or culvert) to the nearest drainage that is approved for receipt of stormwater flows or to on-site percolation devices such as infiltration basins. Runoff from disturbed areas must be detained or filtered to prevent the escape of sediment from the disturbed area.

Conformance with Monterey County General Plan Safety Element Policy S-3.1 would require that post-development, off-site peak flow drainage from the project site would not be greater than pre-development peak flow drainage. On-site improvements or other methods for stormwater detention would be required to maintain post-development, off-site peak flows at no greater than predevelopment levels. Neither the final design of the project nor the estimated off-site peak flows are known at this time. Therefore, mitigation is included to require the development of a final, design-level drainage analysis that would include a detailed evaluation of the potential drainage impacts associated with the project, including identification of measures to reduce runoff by promoting infiltration. Conformance with General Plan Safety Element Policy S-3.2 would require implementation of Best Management Practices to protect groundwater and surface water quality. Adherence to General Plan Safety Element Policy S-3.3 would require installation of drainage facilities concurrent with new development to mitigate the post-development peak flow impact of new development. Conformance with this policy may also be achieved by retaining stormwater flows on-site for infiltration into the underlying groundwater basin. Conformance with Carmel Valley Master Plan Safety Element Policy CV-4.1 would reduce erosion and rapid erosion by limiting the amount of land cleared at any one time to the area that can be developed during one construction season.

Compliance with the regulations and policies discussed above would reduce the risk of water degradation on- and off-site from soil erosion and other pollutants related to construction activities. Implementation of mitigation to develop a design-level drainage analysis and identify measures to reduce runoff by promoting infiltration would further reduce the potential for soil erosion and contaminated runoff. Because violations of water quality standards and waste discharge requirements and the potential for water quality degradation would be minimized, impacts to water quality from construction of the proposed project would be less than significant with implementation of mitigation.

Operation. Operation of the proposed project would result in a net increase of impervious surfaces. Without implementation of appropriate project design elements, Best Management Practices, and pollutant control measures, volumes or rates of discharge and associated pollutants in runoff would increase compared to current conditions. Additionally, operation of the proposed project could potentially result in the addition of contaminants into the stormwater runoff entering the local stormwater drainage system. If stormwater controls are not designed or maintained properly, runoff from the project site could contain contaminants such as oil, grease, metals, and landscaping chemicals (pesticides, herbicides, fertilizers, etc.) that could enter the local stormwater drainage system and ultimately degrade surface water and groundwater quality. Finally, groundwater that would be used for operation of the proposed project (drinking water and other water supply needs) may be treated on-site to remove iron and manganese. Any waste that would be generated by on-site treatment of groundwater would be disposed of in compliance with all applicable regulations, as described above in Section 4.8.2. Compliance with the regulations and policies discussed above would

reduce the risk of water degradation on- and off-site from soil erosion and other pollutants related to project operation. However, because treatment plans for on-site runoff prior to discharge off-site are unknown at this time, mitigation is included to require development of a stormwater quality management plan to minimize pollutant concentrations in on- and off-site runoff. With implementation of the required mitigation and compliance with applicable regulations and policies, this impact would be less than significant.

Mitigation Measures. Mitigation measures H-1a through H-1d are required to ensure that adequate prevention and response is implemented for the accidental release of hazardous materials, that the amount and rate of on- and off-site stormwater runoff would be reduced to the maximum extent feasible, and that all stormwater runoff during construction and operation of the proposed project would be treated prior to discharge off-site to ensure that contaminated runoff does not enter the local stormwater drainage system or nearby waterbodies.

H-1(a) **Accidental Spill Control and Environmental Training**. Prior to the issuance of a grading permit, the applicant shall submit a Spill Response Plan and Spill Prevention, Control and Countermeasure Plan to the County of Monterey for review and approval. The Spill Response Plan (SRP) in combination with the Spill Prevention, Control and Countermeasure (SPCC) Plan to be prepared for the proposed project shall include procedures for quick and safe clean-up of accidental spills. The SRP and/or SPCC shall prescribe hazardous materials handling procedures for reducing the potential for a spill during construction, and shall include an emergency response program to ensure quick and safe clean-up of accidental spills. Additionally, an environmental training program shall be established to communicate environmental concerns and appropriate work practices, including spill prevention and response measures to all field personnel. A monitoring program shall be implemented to ensure that the plans are followed during all construction activities.

H-1(b) **Maintain Vehicles and Equipment**. All vehicles and equipment, including all hydraulic hoses, shall be maintained in good working order to minimize leaks that could escape the vehicle or contact the ground. A vehicle and equipment maintenance log shall be updated and provided by the applicant to the County of Monterey RMA – Planning Department on a monthly basis for the duration of project construction.

H-1(c) **Design-level Drainage Analysis and Minimization of Runoff**. The applicant shall conduct a design-level drainage analysis prior to issuance of a construction permit that shall identify existing drainage patterns across the project site and existing off-site stormwater discharge locations. The drainage analysis shall quantify, to the extent feasible, the existing and predicted post-construction peak runoff rates and amounts both on-site and off-site immediately downgradient of the project site. The drainage

analysis shall identify any changes to the location of down-gradient discharge of stormwater runoff and any potential impacts on off-site property that would result from those changes. Stormwater control measures shall be developed to maximize on-site infiltration of stormwater and minimize off-site stormwater discharge. These stormwater control measures shall be designed to achieve conformance with Monterey County General Plan Safety Element Policy S-3.1 such that post-development, off-site peak flow drainage from the project site would not be greater than pre-development peak flow drainage. The stormwater control measures may include, as necessary, above-ground retention and/or detention basins, stormwater collection tanks, subsurface infiltration devices such as cisterns with permeable bottoms or perforated pipes, permeable pavement, and vegetated swales. The stormwater control measures required by this mitigation may be used, in whole or in part, to satisfy the erosion and runoff control standards of the NPDES-required SWPPP and the Monterey County Code-required erosion control plan.

The design-level drainage analysis shall be submitted to and approved by Monterey County RMA – Public Works, Monterey County RMA – Environmental Services, and Monterey County Water Resources Agency prior to issuance of a construction permit. The identified stormwater control measures shall be installed prior to issuance of occupancy permits.

H-1(d) **Stormwater Control Plan, Operation and Maintenance Plan, and Maintenance Agreements**. Prior to issuance of construction permits, the applicant shall submit a Stormwater Control Plan, prepared by a registered professional engineer, addressing the Post-Construction Stormwater Management Requirements (PCRs) for Development Projects in the Central Coast Region. The plan shall include the location of the drainage facilities and construction details. A report with supporting calculations shall also be provided. The Stormwater Control Plan shall be reviewed by a licensed Geotechnical Engineer to ensure conformance with the Geotechnical Investigation or Engineering Geology Report. Prior to issuance of construction permits, the applicant shall submit an Operation and Maintenance Plan to RMA Environmental Services for review and approval. The plan shall be prepared by a registered Professional Engineer and include, at a minimum, the following: a) a site map identifying all structural Stormwater Control Measures requiring O&M practices to function as designed, b) O&M procedures for each structural Stormwater Control Measure including, but not limited to, LID facilities, retention/detention basins, and proprietorship devices, and c) the O&M plan shall include short- and long-term

maintenance requirements, recommended frequency of maintenance, and estimated cost for maintenance. Prior to issuance of construction permits, the applicant shall enter into a Maintenance Agreement (Agreement) with Monterey County. The applicant shall submit a signed and notarized agreement to RMA Environmental Services for review and approval. The agreement shall clearly identify the responsible party for ongoing maintenance of structural Stormwater Control Measures. The Agreement shall contain provisions for an annual report to be prepared by a registered Professional Engineer. The annual report shall be submitted to RMA Environmental Services, for review and approval, no later than August 15th. All recommended maintenance shall be completed by October 15th of that same year. If maintenance is required, certification shall be provided that all recommended maintenance has been completed before the start of the rainy season.

Significance After Mitigation. Implementation of Mitigation Measures H-1(a) through H-1(d) would reduce the rate and amount of post-development runoff on- and off-site to the maximum extent feasible and would minimize the potential for stormwater to come in contact with on-site pollutants or to transport pollutants off-site. With implementation of these mitigation measures, potential impacts related to violation of water quality standards or waste discharge requirements would be less than significant.

Threshold 2:	*Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level.*
Threshold 12:	*Have insufficient water supplies available to serve the project from existing entitlements and resources, such that new or expanded entitlements are needed.*

Impact H-2 **Net consumptive use of groundwater for the proposed project would be less than the baseline consumptive use and would not result in a net deficit in aquifer volume or a lowering of the local groundwater table level. Sufficient water supplies are available to serve the project from existing entitlements and resources. Impacts would be Class III, *less than significant*.**

The proposed project would convert three parcels with a combined area of 7.9 acres in the lower Carmel Valley from a primarily agricultural land use to a residential subdivision with 24 single-family market-rate homes and seven inclusionary housing units. Two-thirds of the total site area was actively used to farm truck crops until the property changed hands and development was first contemplated in 2005. A single rural residence and natural vegetation occupied the remaining area. Prior to 2005, almost all of the irrigation supply was obtained from the Old Travers well located near the northeast corner of the site, and domestic supply was obtained from the Old Gamboa well in the southeastern part of the site (Todd Groundwater, 2016). Both

wells have since been replaced, and the replacement wells are located near one another in the southeastern part of the site. The Carmel Rio project proposes to use the Gamboa Replacement well as the primary source of supply, and the New Travers well would serve as a backup supply (Todd Groundwater, 2016).

Historical land and water use on the Carmel Rio project site are both well documented. Aerial photographs during the late 1990s and early 2000s show that the site was used to grow truck crops (Google Earth images for 1998, 2002 and 2004). Plans for development commenced in 2005, and the fields were fallow during 2005-2009. Agricultural activities resumed in 2010 and gradually increased to the pre-2005 level of intensity by 2013. Production from wells at the site is metered and annual volumes have been recorded by MPWMD since 1994 (Todd Groundwater, 2016). The baseline period that best represents water use before the development process commenced is 1995-2004. The period includes wet, dry and normal years and is long enough that the average is not unduly influence by any unusual years. Metered water use during that period averaged 11.47 AFY (Todd Groundwater, 2016).

Average annual water use following development was estimated by the project applicant using indoor water use factors provided by MPWMD and outdoor water use estimated using the procedures of the State Model Water-Efficient Landscape Ordinance (Kane, 2014). Indoor water use is for 24 market-rate single-family homes plus seven inclusionary homes. Indoor residential water use would average 5.45 AFY (Todd Groundwater, 2016). The consumption per dwelling unit is based on the number and types of fixtures, as presented by the applicant.

The landscape irrigation water use estimate is based on a detailed site plan with a total irrigated area of 53,980 square feet, or 15% of the total site area (Kane, 2014). The site plan estimated annual irrigation demand using reference evapotranspiration (ET_0) equal to 49.7 in/yr, effective precipitation equal to 10% of annual ET_0, a plant factor (crop coefficient) equal to 0.2 year-round, and an irrigation efficiency of 85%. The resulting estimate of annual irrigation water use was 1.09 AFY (Todd Groundwater, 2016). The accuracy of this estimate of irrigation demand for the proposed project depends on the implementation of applicant-reported project design features, including: planting only drought-tolerant "very low" water use vegetation, installation of drip irrigation, the limitation of irrigation to only 15% of the project site (with approximately 43% of the project site covered by non-irrigated vegetation). In addition to the required implementation of these ambitious project design features, the irrigation demand estimate suffers from several potentially faulty assumptions, including an overestimation of both reference and effective precipitation, and an underestimate of the irrigated area (Todd Groundwater, 2016).

In order to account for the potential deficiencies in the applicant's irrigation water demand estimate, Todd Groundwater doubled the estimate of irrigation use. The revised estimate of total project water demand (from residential use, water filter back-flushing demand, pipe-leak losses, and the revised irrigation water demand) would be 8.39 AFY, or approximately 73% of baseline water use (Todd Groundwater, 2016).

In order to assess the potential drawdown effects on neighboring wells, Todd Groundwater estimated monthly patterns of water use under baseline and project conditions. Under baseline

conditions the maximum monthly water use was 1.93 acre-feet in July (Todd Groundwater, 2016). Under project conditions, the maximum would be 0.78 acre-feet, also in July (Todd Groundwater, 2016). Thus, maximum monthly water use would decrease by more than half under project conditions. Also, the duration of individual pumping cycles would be less under project conditions compared to baseline conditions because residential water use would result in daily pumping cycles, whereas irrigation pumping would occur approximately every other day (but for a longer duration for each event) under baseline conditions.

The location of pumping would change under the project. Under baseline conditions, 90% of groundwater produced by on-site wells was pumped from the Old Travers well, whereas nearly 100% would be pumped from the Gamboa Replacement well following project construction. Consequently, the center of pumping would be shifted 465 feet to the south. At both locations, wells produce groundwater from the Carmel Valley Alluvial Aquifer. The Old Travers well was screened from 90 to 130 feet below ground surface in material described as "river sand and gravel" on the well completion report. The Gamboa Replacement well is screened from 80 to 160 feet below ground surface in "sand, gravels and cobbles". The well completion reports do not reveal any major confining layers within the aquifer. The similar screen depths and alluvial textures indicate that the two wells tap the same aquifer.

The impact of the project on water-level drawdown at nearby wells is the net effect of changes in pumping location and duration of individual pumping cycles. Drawdowns were calculated by Todd Groundwater using the non-equilibrium formula for wells in confined aquifers (Theis, 1935). Drawdown estimates were calculated only for neighboring wells closer to the Gamboa Replacement well than the Old Travers well because those wells would be at risk of increased drawdown. Calculated drawdowns for neighboring wells under both baseline and project conditions are less than 0.02 foot (Todd Groundwater, 2016). The small drawdowns at neighboring wells under baseline conditions would become even smaller under project conditions. The impact of the project on groundwater levels would be less than under baseline conditions at all neighboring well locations and at all time scales ranging from a single pumping cycle to an average year.

MPWMD requires that the capacity of wells supplying a water distribution system be sufficient to meet peak day demand with no more than 12 hours of pumping. The maximum-day 12-hour pumping rate under the applicant's water use assumptions would be 14.4 gallons per minute (gpm) and 15.6 gpm under Todd Groundwater's revised water use assumptions. The Gamboa Replacement well operated at 150 gpm during an 8-hour constant-rate pumping test in 2008, which is roughly an order of magnitude greater than the required rate. Given a similar diameter and screened interval, the New Travers well would pump almost certainly at a rate substantially greater than the required rate. Serving in a backup role, the New Travers well would be capable of supplying the maximum day demand pumping 12 hours per day if the Gamboa Replacement well were off-line for any reason. Therefore, pumping capacity for the project would be adequate.

The impact of the project on the water balance of the Carmel Valley alluvial aquifer and on flow in the Carmel River stems from the change in net consumptive use of groundwater at the project site. Net consumptive use is the amount of groundwater pumping minus the amount of

groundwater recharge. The preceding sections demonstrated that the change in pumping by itself would not adversely impact groundwater levels. However, if the project caused a large decrease in on-site groundwater recharge, the overall groundwater balance could become more negative which could induce percolation from the Carmel River and adversely affect aquatic habitat. Todd Groundwater prepared a soil-moisture-balance model to estimate the net consumptive use of groundwater at the project site. The model accounts for the amount of runoff under both baseline and project conditions that would be retained on-site as soil moisture, the amount that would percolate through the root zone into the underlying aquifer, and the amount that would be discharged through the stormwater drainage system to the Carmel River and leave the valley. The simulated net impact of the project on groundwater recharge was a decrease of 1.92 AFY. Net consumptive use of groundwater under project conditions was 3.16 AFY, or 53% of the baseline value.

This decrease in net consumptive use is based on plant water use and irrigation area estimates provided by the applicant. These assumptions were adjusted to identify the maximum amount of landscape irrigation that could be allowed without increasing net consumptive use above the baseline level. The model concluded that even with more realistic estimates of landscape irrigated area and vegetation type, the project would not increase net consumptive use of groundwater over baseline levels.

In accordance with Monterey County General Plan Policies PS-3.1 and PS-3.2, Todd Groundwater determined the long-term, sustainable water supply available for the project. The Monterey Peninsula Water Management District's Water Supply Planning Committee developed a draft policy in July 2016 specifying that proposed developments in Carmel Valley must decrease net consumptive use of groundwater by 25% relative to baseline conditions. This policy (Draft Ordinance 175) is expected to be adopted prior to issuance of a construction permit for the proposed project and therefore will likely apply to groundwater use for the proposed project. The simulated net consumptive use for the project with the applicant's proposed landscape vegetation would be 53% of the baseline amount and therefore would comply with local water management policies (Todd Groundwater, 2016). Todd Groundwater found that the project could decrease net consumptive use of groundwater to 75% of baseline use with landscaping more lush than proposed by the applicant but with less lawn than in nearby residential areas. Additional reductions in net consumptive use of groundwater could be achieved by percolating rainfall runoff from streets and driveways in roadside drainage swales. Todd Groundwater estimated that an additional 1.67 AFY of groundwater recharge could be achieved through implementation of Low Impact Development (LID) stormwater design in the form of unpaved drainage swales.

The above analysis demonstrates that construction and operation of the proposed project would not substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level. The net consumptive use of groundwater for the proposed project would be less than the baseline net consumptive use and on-site wells have sufficient pumping capacity to satisfy the maximum daily water demand of the proposed project. No new or expanded entitlements would be required. No mitigation is required and impacts would be less than significant.

Mitigation Measures. No mitigation is required.

Significance After Mitigation. Impacts would be less than significant without mitigation.

Threshold 3:	*Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site.*
Threshold 4:	*Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site.*
Threshold 5:	*Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.*
Threshold 6:	*Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.*

Impact H-3 **Construction and operation of the proposed project would alter the on-site topography and increase the amount of on-site impervious surface, which could increase the rate and amount of on- and off-site runoff and result in erosion, flooding, and the need for expanded stormwater drainage facilities. Compliance with existing regulations and policies would help to reduce or avoid such impacts. Mitigation to reduce off-site runoff to the maximum extent feasible would ensure that the proposed project would not result in on- or off-site erosion or flooding or the need for expanded stormwater drainage facilities. This impact would be Class II, *significant but mitigable*.**

The proposed project would alter the existing drainage pattern of the site through the introduction of impervious surfaces and project infrastructure. The introduction of impervious surfaces and other project features, such as access roads, parking lots, rooftops, driveways, patios, and walkways, could increase the rate and/or amount of surface runoff. The rate and amount of surface runoff is determined by multiple factors, including the following: amount and intensity of precipitation; amount of other imported water that enters a watershed; and amount of precipitation and imported water that infiltrates to the groundwater. Infiltration is determined by several factors, including soil type, antecedent soil moisture, rainfall intensity, the amount of impervious surfaces within a watershed, and topography. The rate of surface runoff is largely determined by topography and the intensity of rainfall over a given period of time.

The proposed project would not alter any precipitation amounts or intensities, nor would it require any additional water to be imported into the proposed project area. As described above under Impact H-2, the amount of pumped groundwater that would be applied on-site would be substantially less than that amount of pumped groundwater that was applied under baseline conditions. However, construction would include earth-disturbing activities which may affect site-specific infiltration and permeability during construction (temporary) and during operation (permanent). Temporary changes to on-site permeability would be minimal and limited to covered stockpiles, impermeable surfaces of construction staging areas, and temporarily compacted soils. Permanent impervious areas that would be introduced by the proposed project include impervious access roads, parking areas, rooftops, driveways, patios, and walkways. Based on a review of preliminary site plans, Todd Groundwater estimated the total amount of permanent impervious surface introduced by the proposed project to be approximately 3.42 acres, or approximately 42% of the project site (Todd Groundwater, 2016). In contrast, the applicant reported total on-site impervious cover to be approximately 56% of the total site area (Balance Hydrologics, 2016). Depending on the actual amount of impervious surface that would be introduced by the proposed project, the estimated increase in runoff amount reported below may change. In addition, site preparation would likely result in long-term changes to the infiltration capacity of permeable surfaces due to soil compaction. A soil-moisture-balance model prepared by Todd Groundwater (2016) estimated that on-site groundwater recharge would decrease from 5.54 AFY under baseline conditions to 3.63 AFY under project conditions. This change in groundwater infiltration would result in an additional runoff amount of 1.91 AFY.

In addition to increasing the amount of total annual runoff, the introduction of impervious surfaces would increase the rate of peak runoff leaving the project site. Increase in the amount and rate of runoff could result in increased erosion and sediment transport off-site. The potential erosion and sedimentation impacts of increased runoff are discussed above under Impact H-1. The magnitude of change in peak runoff that would result from implementation of the proposed project is unknown at this time. Mitigation Measure H-1(c), which would require completion of a design-level drainage analysis prior to commencement of construction activities, would result in the quantification of the change in the peak runoff rate and the development and implementation of measures to reduce peak runoff both on- and off-site.

Along with changes to the amount and rate of on- and off-site runoff, construction and operation of the proposed project would result in changes to drainage patterns across the project site and discharge locations for off-site runoff. Grading of the project site and the importation of approximately 11,359 cubic yards of fill to raise the southwest corner of the project site would substantially alter on-site topography, which would alter on-site drainage patterns. The presence of roadways, residential structures, and retaining walls would redirect runoff across the project site. Currently, on-site runoff occurs as sheet flow towards the southwest. Preliminary site plans for the proposed project indicate that runoff would generally drain via gutter flow in a westerly direction before entering a 6.5-foot diameter, 401-foot long perforated stormwater detention pipe. Overflow from the perforated stormwater detention pipe would eventually enter a gravity-flow storm drain system that would connect to an existing 42-inch diameter trunk storm drain line that runs from north to south along the western boundary of the project. This trunk line is the main drainage conduit for County Drainage Area 28 (DA-

28), a watershed of 184 acres that extends from north of Carmel Valley Road to eventually discharge directly into the Carmel River south of the Riverwood Townhomes. Storm drain modeling presented in the County Services Area 50 Final Lower Carmel River Stormwater Management and Flood Control Report (County of Monterey, 2014) identified this trunk line as a potentially large source of drainage overflow that could lead to localized flooding along Rio Road and as far north as the retail businesses located just south of Carmel Valley Road. The primary causes of the predicted overflow are insufficient trunk line capacity, high tailwater conditions in the Carmel River, and lack of back flow prevention at the outfall (Balance Hydrologics, 2016). The fact that the DA-28 trunk storm drain line has been identified as inadequate in its existing condition implies additional stormwater runoff likely cannot be added to the system without impacts.

Preliminary hydrologic calculations and a review of preliminary project site plans by Bestor Engineers concluded that approximately 18,000 cubic feet of stormwater detention capacity would be required to meet County requirements for post-development off-site runoff discharge (Balance Hydrologics, 2016). Balance Hydrologics noted that the planned 6.5-foot diameter, 401-foot long perforated stormwater detention pipe would have a total storage volume of approximately 13,300 cubic feet (Balance Hydrologics, 2016). Balance Hydrologics also concluded that a conservative estimate of the stormwater detention capacity that would be required to meet County requirements for post-development off-site runoff discharge would be approximately 25,000 cubic feet (Balance Hydrologics, 2016). Therefore, current project site development plans would be inadequate to retain the required amount of post-development off-site runoff discharge. Implementation of Mitigation Measure H-1(c), described above under Impact H-1, would require that stormwater control measures be developed to maximize on-site infiltration of stormwater and minimize off-site stormwater discharge. These stormwater control measures shall be designed to achieve conformance with Monterey County General Plan Safety Element Policy S-3.1 such that post-development, off-site peak flow drainage from the project site would not be greater than pre-development peak flow drainage. The stormwater control measures may include, as necessary, above-ground retention and/or detention basins, stormwater collection tanks, subsurface infiltration devices such as cisterns with permeable bottoms or perforated pipes, permeable pavement, and vegetated swales.

Finally, development of the proposed project would alter the existing drainage pattern for off-site, upstream flows that currently cross the project site as sheet flow. Modeling of overland flow break-outs from DA-27 was a component of the work for the CSA-50 Report. DA-27 is a moderately large local tributary to the Carmel River, with a total drainage area of 567 acres (0.88 square miles) extending to the ridgelines of Jacks Peak to the north. Flow paths within this drainage area are well defined in the steep canyon setting north of Carmel Valley Road, but essentially disappear on the south side of the road where a small ditch carries flow for a short distance before ending at a point approximately 700 feet north and west of the northeast corner of the site. The overland flow modeling presented in the CSA-50 Report shows that the intervening topography is such that much of the runoff originating in DA-27 would flow south and west to cross Val Verde Drive at the project site and into CSA-50 (Balance Hydrologics, 2016). The modeling shows that as much as 46 acre-feet could enter CSA-50 from DA-27 and much of this would be overland flow through the site (Balance Hydrologics, 2016).

The site plans do not appear to include any accommodation of this potentially large overland flow. In fact, the street layout in the March 10, 2014 plans are configured such that there is a risk they would collect overland flow and route it into the project with no clear indication of a means to avoid localized flooding on-site and/or an overland release compatible with adjacent properties (Balance Hydrologics, 2016). The on-site problem could be eliminated by raising the elevation of Val Verde Drive sufficiently to protect the project from the DA-27 overland flows, but doing so would block the natural flow release across the property and would require some means of redirecting the flows in a manner that does not impair or endanger adjacent properties to the east. Absent measures to redirect runoff from DA-27, the project site plan would need to be modified to explicitly address the means to safely collect and convey flow through the site and then disperse them at the downslope project boundary in a way that does not adversely impact adjacent parcels. Potential measures to detain and/or retain runoff on-site are discussed under Impact H-1. Implementation of Mitigation Measure H-1(c) would ensure that post-development off-site runoff would not exceed pre-development conditions. Additional mitigation would be required to ensure that on-site structures and residences are not exposed to a risk of loss, injury, or death involving flooding associated with DA-27. The Draft EIR for the proposed Rancho Canada Village project (May 2016) proposes a 84-inch buried drainage pipe along the Rancho Canada Village project boundary, approximately 500 feet east of Val Verde Road. This pipe could connect to the proposed future drainage channel described in the County Services Area 50 Final Lower Carmel River Stormwater Management and Flood Control Report (2014) intended to capture stormwater flows from DA-27.

Compliance with existing regulations and policies and implementation of required mitigation measures would ensure that development carried out under the proposed project would maximize on-site infiltration and minimize off-site runoff, and would not result in the discharge of stormwater that would result in off-site erosion or flooding or exceed the stormwater conveyance capacity of existing or planned stormwater drainage systems.

Mitigation Measures. Mitigation Measure H-1(c) would ensure that the amount and rate of on- and off-site stormwater runoff would be reduced to the maximum extent feasible. No additional mitigation is required.

Significance After Mitigation. Implementation of Mitigation Measure H-1(c) would reduce the rate and amount of post-development runoff on- and off-site to the maximum extent feasible, would minimize the potential for off-site flooding, and would eliminate the need for new or expanded stormwater drainage facilities. With implementation of this mitigation measure, potential impacts related to increased runoff would be less than significant.

Threshold 8:	*Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map.*
Threshold 9:	*Place within a 100-year flood hazard area structures which would impede or redirect flood flows.*

Threshold 10:	*Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam.*

Impact H-4 Construction and operation of the proposed project would place housing within a 100-year flood hazard area which could result in the impedance or redirection of flood flows and the exposure of people and structures to a significant risk of loss, injury, or death involving flooding. Project design features would help to reduce flood risk. Mitigation would further reduce the risk of loss, injury, or death involving flooding. This impact would be Class II, *significant but mitigable*.

As described in the County Services Area 50 Final Lower Carmel River Stormwater Management and Flood Control Report (CSA-50 Report), the site is exposed to flood risks from two distinct flooding sources: overbank flows from the Carmel River and overland flows from the current downstream end of the relatively large north bank tributary known as County Drainage Area 27 (DA-27). A small portion of the project site at the southwest corner of the property is located within a Special Flood Hazard Area (100-year floodplain) mapped by FEMA and analyzed in the CSA-50 Report. The primary source of this flood hazard is overbank flows from the main stem of the Carmel River due to channel overtopping east of Val Verde Drive and, to a lesser extent along the Riverwood Townhomes (Balance Hydrologics, 2016). The CSA-50 Report also shows that backwater flooding through the DA-28 trunk storm drain line can contribute to localized flooding in the same low elevation areas at the project site (Balance Hydrologics, 2016).

The project site plans show that the lower existing ground elevation portions of the property would be raised through use of retaining walls and fill so that they are above the elevation of the 100-year flood. This is an appropriate measure for protecting the project site from the riverine flood risk. However, the placement of fill would remove some floodplain storage and could potentially alter overbank flow paths as well. The project documentation available for review did not address the latter issues, though the impact on residual flood elevations is likely to be very small (Balance Hydrologics, 2016). The CSA-50 report identified a number of potential measures that could be implemented with the objective of eliminating the riverine flood risk in the north overbank area, including the project site. Such measures would have the benefit of removing the flood hazard at the site without the potential for adverse flooding impacts to other occupied structures. One such measure would be to raise the elevation of Val Verde Drive so that it can function as a levee protecting areas to the west from the 100-year flood. An alternative configuration could use a tie-back levee from Rio Road to Rancho Cañada. However, it must be acknowledged that the required work would extend well beyond the project site and would require addressing tributary drainage issues as described above under Impact H-3. Although flooding from upstream flows associated with DA-27 is not associated with a Special Flood Hazard Area (100-year floodplain), improper redirection of those flood flows could result in a significant risk of loss, injury or death involving flooding (Threshold 10) for residents both on- and off-site. The risks associated with improper modification of DA-27 runoff are discussed in detail above under Impact H-3.

If the applicant chooses to remove the southwest portion of the project site from the 100-year floodplain through the placement of fill in that area, the applicant would be required to prepare and submit to FEMA prior to commencement of construction activities a Conditional Letter of Map Revision Based on Fill (CLOMR-F). FEMA would then review the CLOMR-F and determine based on final site design plans whether or not the proposed development would be eligible to be removed from the Special Flood Hazard Area. If FEMA accepts the CLOMR-F, then following construction the applicant would need to demonstrate that the proposed project "as-built" matches the submitted final site designs that were used to support the CLOMR-F. After FEMA determines that the project "as-built" matches the previously submitted final site design plans, the agency would issue a Letter of Map Revision Based on Fill (LOMR-F) to remove the project site from the Special Flood Hazard Area.

Compliance with existing regulations and policies regarding floodplain development and post-development off-site runoff, including Monterey County Code requirements for development within a floodplain, and implementation of required mitigation measures would ensure that project-related structures would not impede or redirect flood flows such that off-site property would be adversely affected and would ensure that on-site structures and people would not be exposed to a significant risk of loss, injury or death involving flooding.

Mitigation Measures. Mitigation Measure H-1(c), combined with Mitigation Measure H-4 below, are required to ensure that on-site structures and people are protected from a significant risk of loss, injury, or death involving flooding and to ensure that the amount and rate of on- and off-site stormwater runoff would be reduced to the maximum extent feasible.

H-4 **Protect Project Structures and Residents from Flood-related Loss, Injury, or Death.** The applicant shall design the project and all on-site structures in a manner that reduces the exposure to loss, injury, or death involving flooding to the maximum extent feasible. Prior to issuance of grading permits, the applicant shall submit a description of proposed flood control measures for review and approval. Measures can include on-site improvements, off-site improvements, or a combination of on- and off-site improvements. Examples of on-site improvements include:

- Raising building foundations above the base flood elevation
- Designing roadways in such a way that they serve as effective levees
- Providing on-site flood capture systems that would intercept and infiltrate flood flows up-gradient of all on-site structures
- Providing on-site drainage facilities to route flood flows around project structures (provided that those on-site drainage facilities do not result in a post-development

discharge of runoff that would exceed pre-development levels)

Examples of off-site improvements include:

- Contribution to, and confirmation of, concrete plans for the implementation of regional flood mitigation strategies. Examples of regional flood mitigation strategies relevant to the project site include:
  - Installation of an upstream conduit to capture DA-27 flood flows and route those flows to the Carmel River (extension further to the north of an 84-inch drainage pipe as proposed by the Rancho Canada Village Project would address this requirement)
  - Raising the elevation of Val Verde Drive sufficiently to protect the project site from the DA-27 overland flows, provided that those re-directed flood flows do not adversely affect off-site properties.

In the case where the applicant chooses to contribute to regional flood mitigation strategies, the applicant shall confirm with the County or appropriate resource agency that those improvements would be constructed prior to the issuance of occupancy permits. If the applicant chooses not to contribute to regional flood mitigation strategies, then the applicant must implement one or more of the on-site improvements listed above such that the exposure to loss, injury, or death involving flooding (including project-induced off-site flooding) would be reduced to the maximum extent feasible.

The applicant shall submit the proposed flood protection measures to Monterey County RMA – Public Works, Monterey County RMA – Environmental Services, and Monterey County Water Resources Agency for approval prior to issuance of a construction permit. The submittal shall clearly demonstrate that all on-site habitable structures would be raised above the base flood elevation or would be fully protected from DA-27 flood waters produced during the 100-year storm event.

Significance After Mitigation. Implementation of Mitigation Measures H-1(c) and H-4 would protect on-site structures and people from a significant risk of loss, injury, or death involving flooding and would reduce the rate and amount of post-development runoff on- and off-site to the maximum extent feasible, which would minimize the potential for off-site flooding. With implementation of these mitigation measures, potential impacts related to flooding would be less than significant.

c. Cumulative Impacts. The geographic extent for this cumulative impact analysis is the Carmel River Watershed, which includes the project site. This watershed is a 255 square mile, southeast-northwest trending watershed in the coast ranges of central Monterey County. The Carmel River Watershed drains the Carmel Valley northwestward and feeds into the Carmel River, which meanders for 36 miles in a northwesterly direction merging with seven major stream tributaries until it flows into the Pacific Ocean at Carmel Bay (MPWMD, 2014). The terminus of the Carmel River with the Pacific Ocean is located approximately 0.7 mile northwest of the project site, just south of the City of Carmel-by-the-Sea. This geographic extent is appropriate for the issue area of hydrology and water quality because the watershed is hydrologically connected, and any surface water quality impacts in one part of the watershed could potentially affect surface water quality elsewhere downstream in the watershed. In addition, this cumulative extent fully encompasses the CVAA (also referred to as the Carmel Valley Groundwater Basin by the California Department of Water Resources [DWR]). This groundwater basin forms the appropriate geographic extent for groundwater quality and recharge effects, as it is the only groundwater basin that would be affected by the proposed project. Thus, the larger geographic scope of the Carmel River Watershed encompasses both geographic extents.

Storm Water Runoff**.** Cumulative development throughout the Carmel River Watershed, including past, present and reasonably foreseeable future development, along with the project, would generally increase impermeable surface area, thereby potentially increasing peak flood flows and overall runoff volumes. However, Monterey County requires all subdivisions to maintain post-development runoff volumes at or below pre-development levels. Cumulative development would be subject to the applicable runoff regulations, thereby ensuring that a cumulative impact would not result. In addition, as discussed above, the project would result in less than significant impacts to stormwater runoff with implementation of mitigation to minimize off-site runoff. For these reasons, the project's cumulative impacts related to increases in stormwater runoff and associated downstream flooding and water quality concerns would be less than significant, and the project's contribution to such effects would not be considerable in any event.

Water Supply. While cumulative development would place additional demand on groundwater and other water sources, those projects would be subject to environmental review that would assess and seek to minimize the potential impacts to water supply and groundwater levels in the CVAA. The CVAA has not been declared to be in overdraft (Todd Groundwater, 2016). Groundwater levels still recover to a "full" level by the end of winter in most years (Todd Groundwater, 2016). Further, compliance with SWRCB Order WR 2016-0016 requires a regional solution to excessive municipal water supply withdrawals in the CVAA. Finally, Monterey County 2010 General Plan Public Services Element Policies PS-1.1 and PS-1.3 prohibit the discretionary approval of new development unless the County finds that a long-term, sustainable water supply exists or will be provided concurrent with the development. The impact analysis above shows that implementation of the proposed project would result in a net reduction in consumptive groundwater use, thus reducing overall water demand on the aquifer. Cumulative impacts related to groundwater recharge would be less than significant, and the project's contribution to this cumulative effect would not be considerable in any event.

Water Quality-Waste Discharge. Construction activity associated with cumulative development would increase erosion and sedimentation resulting from grading and construction. In addition, new development would increase the generation of urban pollutants that may adversely affect water quality in the long term. However, future construction activity on projects that disturb one or more acres of soil would be required to comply with the NPDES program through preparation of a SWPPP, which outlines BMPs that would address post-construction runoff. In addition, future development would be required to comply with Monterey County codes and General Plan policies that regulate grading, drainage, and erosion and contain requirements regarding discharge and construction site stormwater runoff control. Also, cumulative development projects would be required to comply with Central Coast RWQCB adopted Resolution No. R3-2013-0032, which sets forth post-construction stormwater management requirements for development projects in the central coast region. These requirements include specific performance requirements with the objective to ensure reduction of pollutant discharges to the maximum extent practical and to prevent stormwater discharges from causing or contributing to a violation of receiving water quality standards. In addition, as discussed above, the project would result in less than significant impacts to water quality, with implementation of required mitigation and the applicable requirements and standards as part of the project's design. For these reasons, the project's contribution to cumulative impacts would be less than significant.

Flooding. Cumulative development may potentially increase runoff volumes that could contribute to increased flood volumes. However, the project, along with other cumulative development in Monterey County, would be required to comply with existing County and FEMA floodplain management and storm water discharge regulations, if such development is located in a flood zone. As discussed above, the project would result in less than significant impacts related to flooding with implementation of required mitigation. Therefore, cumulative impacts would be less than significant, and the project's contribution to cumulative impacts would be less than significant.

4.9 LAND USE

4.9.1 Summary

Table 4.9-1 summarizes the identified environmental impacts, proposed mitigation measures, and residual impacts of the proposed project with regard to land use. Additional detail is provided in Section 4.9.3 (Impact Analysis).

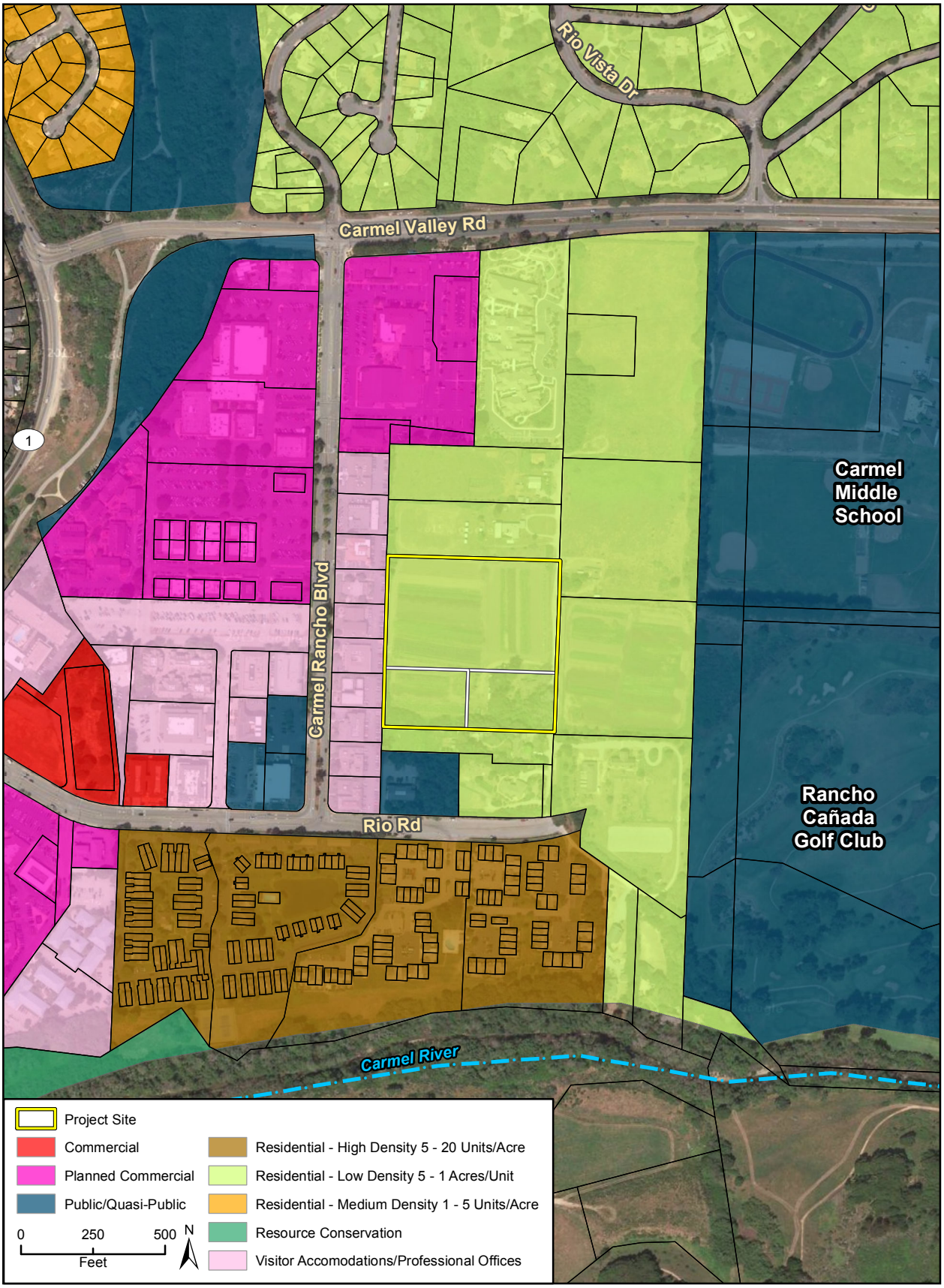
Table 4.9-1
Impact and Mitigation Summary: Land Use

Impact	Mitigation Measures	Residual Impact
Impact LU-1 The project would not physically divide an established community. Impacts would be Class III, less than significant.	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact LU-2 Based on the current project design and following implementation of the mitigation measures identified throughout this EIR, the proposed project would be generally consistent with applicable policies of the Monterey County 2010 General Plan and the supplemental policies of the CVMP. This would be a Class II, significant but mitigable, environmental impact.	Mitigation measures identified throughout this EIR would serve to reduce identified environmental impacts and further improve consistency of the project with certain General Plan policies. However, no specific mitigation for this impact is required.	With implementation of mitigation measures identified throughout this EIR, impacts would be reduced to a less than significant level.

4.9.2 Setting

a. Regional Land Use. The project site is located within the greater Monterey Peninsula in unincorporated Monterey County, which occupies approximately 3,771 square miles of both urban and rural land uses. Within Monterey County, agriculture is the largest land use representing about 60% of the total land area. The second largest land use, about 28% of the total land area, consists of public and quasi-public land uses such as parks, military facilities, recreational and community facilities. Approximately 1% of Monterey County, not including the incorporated cities, is developed with residential, commercial, and industrial land uses. The remaining area includes a substantial amount of land within the County that is owned or administered by the Federal Government, including Los Padres National Forest, military facilities, and land operated by the Bureau of Land Management (County of Monterey, 2010).

The project is located approximately 0.7 mile southeast of the City of Carmel-by-the Sea, outside the City's sphere of influence and outside of the Local Coastal Zone. Land uses within the Mouth of the Valley are primarily commercial and residential uses, with some agricultural, open space, and institutional uses. This planning area is subject to the policies contained in the Monterey County General Plan and the supplemental policies of the Carmel Valley Master Plan (CVMP). The existing land uses and zoning designations for the site and surrounding area are shown in Figure 4.9-1.



Imagery provided by Google and its licensors © 2016.
Additional data provided by County of Monterey, 2010.

Existing Land Uses

Figure 4.9-1

b. Project Site Setting. The project site is located on approximately 7.9 acres, of which 6.6 acres are currently used for row crop agriculture and the remaining 1.3 acres, located at the southeast corner of the site, is developed with an existing single-family residence and detached garage. The southeast corner of the site also contains planted mixed woodland habitat. **The project site** is bordered to the north and south by rural density single-family residences, to the east across Val Verde Drive by undeveloped land, and to the west by existing commercial use buildings and parking lots which are entered from Carmel Rancho Boulevard. The undeveloped property to the east was previously approved for development of the Carmel Community Life Center; however, entitlements for this project have expired. Beyond the undeveloped land across Val Verde Drive is the Rancho Canada Golf Club, located approximately 500 feet east of the southeast corner of the site. The Carmel River is located approximately 1,050 feet south of the site, and Carmel Middle School is located approximately 500 feet east of the northeastern corner of the site. Carmel Valley Road is located approximately 1,050 feet north of the site; however, Val Verde Drive does not connect to Carmel Valley Road.

c. Regulatory Setting. Applicable plans, regulations, and policies relevant to the proposed project are described below.

The project site is subject to the policies contained in the Monterey County General Plan and the supplemental policies of the CVMP. The CVMP land use designation for the site is Residential – Low Density (LD) 5 – 1 Acres/Unit, as shown in Figure 4.9-1. The site is currently zoned Low Density Residential (max. one unit per acre), Design Control, Site Plan Review, and Residential Allocation Zoning (LDR/1-D-S-RAZ). The project site is also subject to CVMP Policy CV 1.10, which allows up to four units per acre if at least 25% of the units are developed for individuals of low and moderate income or for workforce housing. These existing land use and zoning designations are discussed in greater detail below.

County of Monterey General Plan. Monterey County's 2010 General Plan consists of eight elements, including all of the mandatory elements [land use, circulation, housing, conservation and open space, and safety (includes noise)], plus agriculture, economic development and public services elements. Elements included in the General Plan that are applicable to the proposed project are described below.

Land Use Element. The Land Use Element guides decision makers, planners and the general public as to the ultimate pattern of development within the unincorporated areas of the County. It designates the general distribution, location and extent of land uses, such as housing, business, industry, open space, agriculture, natural resources, recreation, and public/quasi-public uses. The Land Use Element also discusses the standards of residential density and non-residential intensity for the various land use designations. Countywide policies that are applicable to the entire unincorporated area are included in the Land Use Element. More focused policies that address specific regional or local issues are found in Area Plans, including the CVMP, discussed below.

Circulation Element. The Circulation Element identifies the general location and extent of existing and proposed major transportation facilities for vehicle, rail, air, water, and bicycle transportation including goals relative to: (a) major roadways; (b) movement of people and goods; (c) scenic highways; and (d) public transit. The Circulation Element provides policy

direction for the transportation systems that serve the unincorporated lands of Monterey County and describes how the County intends to serve transportation needs during the lifetime of the General Plan as the County's population grows.

Agriculture Element. The Agriculture Element establishes policies directed at enhancing and supporting long-term productivity and commercial viability of the County's agricultural industry. The purpose of the Agricultural Element is to: (a) identify ways in which agricultural uses are addressed differently than other land use policies in the General Plan; (b) establish exemptions for routine agricultural activities; (c) include measures designed to protect agricultural operations such as buffers and compatible uses, and to help strengthen the County's "Right-to-Farm" Ordinance.

Carmel Valley Master Plan. CVMP policies both refine General Plan policies and provide unique policies specific to the Carmel Valley geographic area. The project is subject the CVMP supplemental policies, in particular Policy CV-1.10, which prescribes allowable densities for projects within the Val Verde area, as follows:

> *Policy CV-1.10*: The Val Verde Drive area is planned for residential use at a basic density of one (1) unit per acre. With suitable clustering, up to two (2) units per acre may be allowed. However, a density of up to four (4) units per acre may be allowed provided that at least 25% of the units are developed for individuals of low and moderate income or for workforce housing. This policy is intended to be independent from Policy CV-1.11, and not counted in conjunction with the density bonus identified in that policy.

Based on Policy CV-1.10, the 7.9-acre project site could be developed with up to 31 residential units, including 7.75 affordable units or equivalent.

Other CVMP policies applicable to the proposed project are listed and discussed in Table 4.9-3 below.

Zoning Ordinance. The purpose of the Zoning Ordinance is to:

a. Assist in providing a definite plan of development for the County, and to guide, control and regulate the future growth of the County, in accordance with said plan;
b. Protect the character and the social and economic stability of agricultural areas, residential areas, commercial areas, industrial areas, and other areas, within the County and to assure the orderly and beneficial development of such areas;
c. Protect the public safety from the location of structures and other uses of land which may cause interference with existing or prospective traffic movement on highways;
d. Implement the Monterey County General Plan, adopted area plans, specific plans and the policies and standards adopted by the Monterey County Board of Supervisors;
e. Provide regulations of sufficient clarity and detail for the location and nature of Zoning Districts to provide the appropriate authorities and the public with clear standards and direction in the land use decision making process;
f. Provide a sufficient level of review and public hearing processes for adequate and necessary public participation in the review of development projects; and

g. Provide standards and procedures for preservation and exercise of property development rights.

The project site is zoned Low Density Residential (max. one unit per acre), Design Control, Site Plan Review, and Residential Allocation Zoning (LDR/1-D-S-RAZ). This existing zoning designation allows a maximum development density of one acre/unit. However, as described previously, the site is also subject to Carmel Valley Master Plan Policy CV-1.10, which allows up to 4 units per acre if at least 25% of the units are developed for individuals of low and moderate income or for workforce housing. The Design Control (D) Zoning District regulates the location, size, configuration, materials, and colors of structures and fences to assure protection of the public viewshed, neighborhood character, and to assure the visual integrity. The Site Plan Review Zoning District (S) requires review of the location of the development with a required Site Plan Approval Application, as the project is located in an area of the County where development has the potential to adversely affect or be adversely affected by natural resources or site constraints. The Residential Allocation Zoning (RAZ) District limits the number of lots or units which may be created in a given period of time. Projects in the D, S, and RAZ, Districts are also subject to Chapter 21.62 - Height and setback exceptions.

4.9.3 Impact Analysis

a. Methodology and Significance Thresholds. In accordance with Appendix G of the *State CEQA Guidelines*, the proposed project would result in potentially significant land use impacts if it would:

1. Physically divide an established community;
2. Conflict with any applicable land use plan, policy, or regulation of any agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect; and/or
3. Conflict with any applicable habitat conservation plan or natural community conservation plan.

The proposed project is not located within the boundaries of an adopted Habitat Conservation Plan, Natural Community Conservation Plan or other approved conservation agreement within the County (California Department of Fish and Wildlife, 2015); accordingly, the project would not conflict with any such plan. Therefore, threshold 3 is not discussed further in this section, but details are provided in Section 4.16, *Effects Found Not to Be Significant*.

Compatibility between proposed on-site land uses and adjacent land uses during both construction and operation are described in Impacts AQ-1 and AQ-5 in Section 4.3, *Air Quality* and in Impacts N-1 through N-4 in Section 4.11, *Noise.*

b. Project Impacts and Mitigation Measures.

Threshold 1:	*Physically divide an established community.*

Impact LU-1 The project would not physically divide an established community. Impacts would be Class III, *less than significant*.

The proposed project would not physically divide an established community. The majority of the project site is currently used for agricultural purposes. One residential unit located in the southeast corner of the site would be demolished as a result of the proposed project. The project site is bordered to the north and south by low density single-family residences; to the east across Val Verde Drive by undeveloped land; and to the west by existing commercial use buildings and parking lots which are accessed from Carmel Rancho Boulevard. Based on the presence of surrounding development, the project would not physically divide an established community. Further, the proposed project would not create new roadways that would create barriers between neighborhoods. Impacts would be less than significant.

Mitigation Measures. No mitigation is required.

Significance After Mitigation. Impacts would be less than significant without mitigation.

Threshold 2:	*Conflict with any applicable land use plan, policy, or regulation of any agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect.*

Impact LU-2 Based on the current project design and following implementation of the mitigation measures identified throughout this EIR, the proposed project would be generally consistent with applicable policies of the Monterey County 2010 General Plan and the supplemental policies of the CVMP. This would be a Class II, *significant but mitigable,* environmental impact.

The following discussion focuses on those General Plan and CVMP goals and policies that relate to avoiding or mitigating environmental impacts, and an assessment of whether any inconsistency with these standards creates a significant physical impact on the environment. Only policies relevant and applicable to the proposed project are included. Policies that are redundant between elements are omitted. In addition, some policies have been truncated in instances where the overall meaning of the policy would not be made unclear. Tables 4.9-1 and 4.9-2 contain a discussion of the proposed project's consistency with applicable policies of the CVMP and Monterey County General Plan, respectively.

Table 4.9-2
Policy Consistency: Monterey County 2010 General Plan

Monterey County General Plan Policy	Consistency Discussion
Land Use Element	
LU-1.2: Premature and scattered development shall be discouraged.	**Consistent.** The project site is surrounded by a mix of single family residential and commercial land uses. Directly to the north and south are single family homes with some equestrian use. On the south side of Rio Road, to the south of the project site, higher density housing has been developed with two story townhomes. Directly to the west of the project are commercial use buildings along the east side of Carmel Rancho Boulevard. To the east of the project, across Val Verde Drive, is an undeveloped parcel of land that was previously entitled for a Community Center, and further east is the Carmel Valley Middle School. The proposed project would be adjacent to and within the vicinity of established residential and commercial land uses; therefore, the project would not result in premature or scattered development, and is consistent with this policy.
LU-1.5: Land uses shall be designated to achieve compatibility with adjacent uses.	**Consistent.** The project site is bordered to the north and south by low density single-family residences; to the east across Val Verde Drive by undeveloped land; and to the west by existing commercial use buildings and parking lots which are accessed from Carmel Rancho Boulevard. Development of the project site with residential uses would be consistent with uses directly to the north and south, and the proposed density would be similar to commercial uses to the west and multi-family residential uses south of Rio Road. Therefore, the project would be compatible with surrounding uses, consistent with this policy.
LU-1.11: Development proposals must be consistent with the General Plan Land Use Map designation of the subject property and the policies of this plan. The policy refers to respective Area/Master Plans, including the Carmel Valley Master Plan.	**Consistent.** The project site is designated Residential – Low Density (LD) 5 – 1 Acres/Unit, but is subject to CVMP Policy CV 1.10, which allows up to four units per acre if at least 25% of the units are developed for individuals of low and moderate income or for workforce housing. As discussed under Policy CV 1.10 in Table 4.9-3 above, the project would be consistent with the density allowable under this policy. Therefore, the project would be consistent with General Plan Policy LU-1.11.
LU-2.13: The County shall assure consistent application of an Affordable Housing Ordinance that requires 25% of new housing units be affordable to very low, low, moderate, and workforce income households. The Affordable Housing Ordinance shall include the following minimum requirements: a. 6% of the units affordable to very low-income households b. 6% of the units affordable to low-income households c. 8% of the units affordable to moderate-income households d. 5% of the units affordable Workforce I income households	**Consistent.** Refer to CVMP Policy CV-1.10 consistence discussion in Table 4.9-3. As noted therein, approximately 22.6% of the total of 31 units would be affordable. The remainder of the affordability requirement would be med through payment of an in-lieu fee of $206,544 to contribute to the provision of housing for low and moderate income households consistent with Section 18.40.090(A)(3) of the Monterey County Code. By paying the in-lieu fee for the fraction of a unit, the project would provide the required 25% of inclusionary housing, consistent with this policy.

Table 4.9-2
Policy Consistency: Monterey County 2010 General Plan

Monterey County General Plan Policy	Consistency Discussion
Circulation Element	
C-1.1: The acceptable level of service for County roads and intersections shall be Level of Service (LOS) D, except as follows: a. Acceptable level of service for County roads in Community Areas may be reduced below LOS D through the Community Plan process. b. County roads operating at LOS D or below at the time of adopting this General Plan shall not be allowed to be degraded further except in Community Areas where a lower LOS may be approved through the Community Plan process. c. Area Plans prepared for County Planning Areas may establish an acceptable level of service for County roads other than LOS D. The benefits which justify less than LOS D shall be identified in the Area Plan. Where an Area Plan does not establish a separate LOS, the standard LOS D shall apply.	**Consistent.** As described in Section 4.14, *Transportation and Circulation*, LOS C is the minimum acceptable level of service for roadways and intersections within Carmel Valley. Per CVMP Policy 2.18, LOS D has been established as the minimum acceptable level of service for several segments along Carmel Valley Road. The *Traffic Impact Analysis* prepared for the proposed project (Hatch Mott MacDonald, June 2016), as summarized in Section 4.14, *Transportation and Circulation,* utilizes these identified LOS standards, consistent with this policy.
C-1.11: In addition to the County Traffic Impact Fee established in Policy C-1.8, the County shall require new development to pay a Regional Traffic Impact Fee developed collaboratively between TAMC, the County, and other local and state agencies to ensure a funding mechanism for regional transportation improvements mitigating Traffic Tier 3 impacts.	**Consistent.** The proposed project would be required to pay the Carmel Valley Traffic Impact Improvement Program (CVTIP) fee, the TAMC fee, and the Monterey County traffic impact fee. Therefore, the project would be consistent with this policy.
C-2.7: New development shall be located and designed with convenient access and efficient transportation for all intended users and, where possible, consider alternative transportation modes.	**Consistent.** As noted in Section 4.14, *Transportation and Circulation*, the project is located within an eight to eighteen-minute walk to a wide variety of public-serving businesses. In the vicinity of the proposed project, Class II bike lanes are provided on the north side of Carmel Valley Road east of Carmel Rancho Boulevard, and on the south side of Carmel Valley Road east of Carmel Middle School. Monterey-Salinas Transit bus service is located within the vicinity of the project site along Rio Road, Carmel Rancho Boulevard, and Carmel Valley Road between Carmel Valley Village and the Monterey Transit Plaza. Because the project site has convenient access to services and public transportation, the project would be consistent with this policy.
C-3.6: The County shall establish regulations for new development that would intensify use of a private road or access easement. Proof of access shall be required as part of any development application when the proposed use is not identified in the provisions of the applicable agreement.	**Consistent.** The project site would be accessed from Val Verde Drive, an existing two-lane unimproved private road that runs north-south from Rio Road. The project applicant has provided proof of access as part of the project application, consistent with this policy.
Conservation and Open Space Element	
OS-1.9: Development that protects and enhances the County's scenic qualities shall be encouraged.	**Consistent.** As described in Section 4.1, *Aesthetics*, the project site is not located in a visually sensitive area, and it has limited visibility from public viewing locations, such as Carmel Valley Road. No scenic vista would be blocked or significantly altered. Construction and operation of the project would not have a substantial adverse effect on the County's scenic

Table 4.9-2
Policy Consistency: Monterey County 2010 General Plan

Monterey County General Plan Policy	Consistency Discussion
	qualities. Therefore, the project would be consistent with this policy.
OS-4.1: Federal and State listed native marine and fresh water species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant shall be protected. Species designated in Area Plans shall also be protected.	**Consistent.** As described in Section 4.3, *Biological Resources*, special status animal species could potentially occur within the planted mixed woodland and agricultural areas on-site. In addition, construction of the proposed project could have potential impacts to nesting birds. Mitigation in Section 4.3, *Biological Resources*, would reduce impacts to special status plants and animals to a less than significant level. Therefore, the project would be consistent with this policy.
OS-5.4: Development shall avoid, minimize; and mitigate impacts to listed species and critical habitat to the extent feasible.	**Consistent.** See discussion under Policy OS-4.1. As discussed in Section 4.3, *Biological Resources,* the project site does not contain any critical habitat.
OS-5.16: A biological study shall be required for any development project requiring a discretionary permit and having the potential to substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, or substantially reduce the number or restrict the range of an endangered, rare, or threatened species A biological study shall include a field reconnaissance performed at the appropriate time of year. Based on the results of the biological study, biological surveys may be necessary to identify, describe, and delineate the habitats or species that are potentially impacted. Feasible measures to reduce significant impacts to a less than significant level shall be adopted as conditions of approval.	**Consistent.** As described in Section 4.3, *Biological Resources,* the following biological resource reports were prepared for the proposed project: • Biological Assessment for Val Verde Property (Rana Creek Habitat Restoration, 2007) • Updated Biological Assessment for the Val Verde Property (Rana Creek Habitat Restoration, 2012) • Report on Steelhead (south-central California coast DPS) (2016). The above reports were peer reviewed by Rincon Consultants in February 2016. In addition, Rincon Consultants prepared a reconnaissance survey of the project site on February 5, 2016. Feasible mitigation measures required for the proposed project arising from the impact analysis are described in Section 4.3, *Biological Resources,* of this EIR. Because biological studies have been prepared and feasible measures to reduce impacts have been identified, the project would be consistent with this policy.
OS-5.25: Occupied nests of statutorily protected migratory birds and raptors shall not be disturbed during the breeding season (generally February 1 to September 15). The county shall: A. Consult, or require the developer to consult, with a qualified biologist prior to any site preparation or construction work in order to: (1) determine whether work is proposed during nesting season for migratory birds or raptors, (2) determine whether site vegetation is suitable to nesting migratory birds or raptors, (3) identify any regulatory requirements for setbacks or other avoidance measures for migratory birds and raptors which could nest on the site, and (4) establish project-specific requirements for setbacks, lock-out periods, or other methods of	**Consistent**. As described in Section 4.3, *Biological Resources*, construction of the proposed project could directly impact nesting raptors and other avian species protected under existing regulations. Mitigation Measure B-2 would reduce potential impacts to nesting raptors and other avian species to a less than significant level. Therefore, the project would be consistent with this policy.

Table 4.9-2
Policy Consistency: Monterey County 2010 General Plan

Monterey County General Plan Policy	Consistency Discussion
avoidance of disruption of nesting birds. B. Require the development to follow the recommendations of the biologist. This measure may be implemented in one of two ways: (1) preconstruction surveys may be conducted to identify active nests and, if found, adequate buffers shall be provided to avoid active nest disruption until after the young have fledged; or (2) vegetation removal may be conducted during the non-breeding season (generally September 16 to January 31); however, Removal of vegetation along waterways shall require approval of all appropriate local, state, and federal agencies. This policy shall not apply in the case of an emergency fire event requiring tree removal. This policy shall apply for tree removal that addresses fire safety planning, since removal can be scheduled to reduce impacts to migratory birds and raptors.	
OS-6.1: Important representative and unique archaeological sites and features shall be identified and protected for all parcels with undisturbed natural conditions (i.e., ungraded properties), consistent with State Office of Historic Preservation guidelines and definitions employed on a statewide basis, including Phase I, II, and III studies.	**Consistent.** As described in Section 4.5, *Cultural Resources*, a Preliminary Archaeological Reconnaissance was prepared for the proposed project (Archeological Consulting, 2007; updated 2016), and peer reviewed by Rincon Consultants (2015 and 2016). The project site is not located in an area of high archeological sensitivity, and records searched and previous archeological studies did not indicate the presence of archeological resources on the site. However, Mitigation Measure CR-2 is required to protect cultural remains in the event previously unidentified cultural resources are encountered during construction or land disturbance activities. These measures would ensure that previously unidentified sites are protected, consistent with this policy.
OS-7.1: Important representative and unique paleontological sites and features shall be identified and protected. Developers shall be required to complete Phase I (reconnaissance level) paleontological reviews in any formation known to yield important elements of the fossil record. If significant fossil deposits are found during grading activities, data recovery shall be required to obtain a sample of materials from such deposits prior to their systematic destruction.	**Consistent.** As described in Section 4.5, *Cultural Resources*, construction of the project would involve surface excavation that could have the potential to unearth and/or impact paleontological resources. Implementation of Mitigation Measures CR-3(a) and CR-3(b) would reduce impacts to a less than significant level, and the project would be consistent with this policy.
OS-10.9: The County of Monterey shall require that future development implement applicable Monterey Bay Unified Air Pollution Control District control measures. Applicants for discretionary projects shall work with the Monterey Bay Unified Air Pollution Control District to incorporate feasible measures that assure that health-based standards for diesel particulate emissions are met. The County of Monterey will require that future construction operate and implement MBUAPCD PM_{10} control measures to ensure that construction-related PM_{10} emissions do	**Consistent.** As described in Section 4.2, *Air Quality*, PM_{10} emissions associated with construction activity would be well below the 82 pounds per day threshold established by the MBUAPCD. Therefore, the project would be consistent with this policy.

Table 4.9-2
Policy Consistency: Monterey County 2010 General Plan

Monterey County General Plan Policy	Consistency Discussion
not exceed the MBUAPCD's daily threshold for PM_{10}. The County shall implement MBUAPCD measures to address off-road mobile source and heavy duty equipment emissions as conditions of approval for future development to ensure that construction-related NO_x emissions from non-typical construction equipment do not exceed the MBUAPCD's daily threshold for NO_x.	
Safety Element	
S-1.1: Land uses shall be sited and measures applied to reduce the potential for loss of life, injury, property damage, and economic and social dislocations resulting from ground shaking, liquefaction, landslides, and other geologic hazards in the high and moderate hazard susceptibility areas. **S-1.3:** Site-specific geologic studies may be used to verify the presence or absence and extent of the hazard on the property proposed for new development and to identify mitigation measures for any development proposed… **S-1.5:** Structures in areas that are at high risk from fault rupture, landslides or coastal erosion shall not be permitted unless measures recommended by a registered engineering geologist are implemented to reduce the hazard to an acceptable level… **S-1.6:** New development shall not be permitted in areas of known geologic or seismic hazards unless measures recommended by a California certified engineering geologist or geotechnical engineer are implemented to reduce the hazard to an acceptable level… **S-1.7:** Site-specific reports addressing geologic hazard and geotechnical conditions shall be required as part of the planning phase and review of discretionary development entitlements and as part of review of ministerial permits in accordance with the California Building Standards Code… **S-1.8:** As part of the planning phase and review of discretionary development entitlements, and as part of review of ministerial permits in accordance with the California Building Standards Code, new development may be approved only if it can be demonstrated that the site is physically suitable and the development will neither create nor significantly contribute to geologic instability or geologic hazards.	**Consistent.** Impacts related to geologic hazards addressed in these policies are described in Section 4.6, *Geology/Soils.* As noted therein, impacts related to ground-shaking, liquefaction, landslides, and other geologic hazards would be less than significant. There would be no impacts related to fault rupture or coastal erosion, as the site is not located over a mapped fault, nor adjacent to the coastline. This analysis was based in part on two site-specific reports: Geotechnical Engineering Report (Buena Geotechnical Services, 2007) and Geological Hazards Study (Earth Systems Pacific, 2010). Based on these site-specific studies and the analysis in Section 4.6, *Geology/Soils,* the site is physically suitable and the proposed development would not create nor significantly contribute to geologic instability or geologic hazards. Therefore, the project would be consistent with these policies.
S-2.3: All new development, including filling, grading, and construction, within designated 100-year floodplain areas shall conform to the guidelines of FEMA and the National Flood Insurance Program and ordinances established by the County Board of	**Not Applicable.** As shown in Figure 4.8-1, the lower southwestern portion of the site falls within the 100-year flood zone. The primary source of this flood hazard is overbank flows from the main stem of the Carmel River due to channel overtopping east of Val

Table 4.9-2
Policy Consistency: Monterey County 2010 General Plan

Monterey County General Plan Policy	Consistency Discussion
Supervisors. **S-2.6:** Drainage and flood control improvements needed to mitigate flood hazard impacts associated with potential development in the 100-year floodplain shall be determined prior to approval of new development and shall be constructed concurrently with the development.	Verde Drive and, to a lesser extent, along the Riverwood Townhomes (Balance Hydrologics, 2016). Overland flow from County Drainage Area 27 (DA-27) currently results in shallow flooding on-site (generally less than one foot in depth), but this flood risk does not appear to comprise a substantial component of the FEMA-identified 100-year floodplain. Mitigation identified in Section 4.9 would require that the applicant obtain a Conditional Letter of Map Revision – Fill prior to initiation of construction activities, as well as to design the project to minimize impedance of flood flows and to ensure that redirected flood flows would not adversely affect off-site property beyond baseline conditions. With implementation of these measures, the project would conform to the guidelines of FEMA, and the required improvements would be determined prior to development, consistent with these policies.
S-3.1: Post-development, off-site peak flow drainage from the area being developed shall not be greater than pre-development peak flow drainage. On-site improvements or other methods for storm water detention shall be required to maintain post development, off-site, peak flows at no greater than predevelopment levels, where appropriate, as determined by the Monterey County Water Resources Agency.	**Consistent.** As described in Section 4.9, *Hydrology and Water Quality*, the proposed project could alter the existing drainage pattern of the project area, and would introduce impervious surfaces into an area that is currently undeveloped. The proposed project may therefore increase runoff, resulting in flooding or increased erosion downstream. The final design of the project would be required to be developed in accordance with a final, design-level, drainage analysis which would include a detailed evaluation of the potential drainage impacts associated with the project, including identification of measures to reduce runoff by promoting infiltration. In addition, the proposed project would be required to comply with the NPDES program, including through preparation of a SWPPP and implementation of associated BMPs.Compliance with recommendations in the design-level drainage analysis and existing regulations would ensure consistency with this policy.
S-3.2: Best Management Practices to protect groundwater and surface water quality shall be incorporated into all development.	**Consistent.** As described in Section 4.8, *Hydrology and Water Quality*, the proposed project would be required to comply with the NPDES program, including through preparation of a SWPPP and implementation of associated BMPs, as well as implementation of an erosion control plan consistent with the County of Monterey standards as a condition of project approval. In addition, a number of the required mitigation measures included in Section 4.8 would provide additional protection for groundwater and surface water quality.
S-3.3: Drainage facilities to mitigate the post-development peak flow impact of new development shall be installed concurrent with new development.	**Consistent.** See discussion under Policy S-3.1.

Table 4.9-2
Policy Consistency: Monterey County 2010 General Plan

Monterey County General Plan Policy	Consistency Discussion
S-4.11: The County shall require all new development to be provided with automatic fire protection systems (such as fire breaks, fire-retardant building materials, automatic fire sprinkler systems, and/or water storage tanks) approved by the fire jurisdiction. **S-4.13:** The County shall require all new development to have adequate water available for fire suppression. The water system shall comply with Monterey County Code Chapter 18.56, NFPA Standard 1142, or other nationally recognized standard. The fire authority having jurisdiction, the County Departments of Planning and Building Services, and all other regulatory agencies shall determine the adequacy and location of water supply and/or storage to be provided. **S-4.14:** Water systems constructed, extended, or modified to serve a new land use or a change in land use or an intensification of land use, shall be designed to meet peak daily demand and recommended fire flow.	**Consistent.** As described in Section 4.12, *Public Services*, as part of the project design, the placement of fire hydrants and installation of automatic sprinkler systems would be designed with the guidance of the CFPD in accordance with Monterey County's applicable fire conditions and other standards. As noted in Section 4.8, *Hydrology and Water Quality,* adequate water would be available for fire suppression. Therefore, the project would be consistent with this policy.
S-4.22: Every building, structure, and/or development shall be constructed to meet the minimum requirements specified in the current adopted state building code, state fire code, Monterey County Code Chapter 18.56, and other nationally recognized standards.	**Consistent.** The proposed project would be required to meet the minimum requirements of the adopted building codes and standards in place at the time of construction, consistent with this policy.
S-4.20: Reduce fire hazard risks to an acceptable level by regulating the type, density, location, and/or design and construction of development.	**Consistent.** As described in, Section 4.7, *Hazards*, the project site is not located in a fire hazard severity zone as mapped by CAL FIRE. Furthermore, the proposed project would be designed to protect structures through required compliance with applicable standards set forth in the Fire Code, CBC, the CVMP, Monterey County General Plan Safety Element, and the Monterey County's Emergency Operations Plan. Based on the analysis in the Section 4.7, *Hazards*, impacts from wildland fires would be less than significant. Therefore, the project is consistent with this policy.
S-7.2: Proposed development shall incorporate design elements necessary to minimize noise impacts on surrounding land uses and to reduce noise in indoor spaces to an acceptable level. **S-7.4:** New noise generators may be allowed in areas where projected noise levels are "conditionally acceptable" only after a detailed analysis of the noise reduction requirements is made and needed noise mitigation features are included in project design. **S-7.5:** New noise generators shall be discouraged in areas identified as "normally unacceptable." Where such new noise generators are permitted, mitigation to reduce both the indoor and outdoor noise levels will be required.	**Consistent.** As described in Section 4.10, *Noise*, the proposed project would add sources of long-term operational noise to the project site. However, this noise is not expected to result in a substantial increase in ambient noise levels on the project site that would affect nearby sensitive noise receptors. The project site is not within any of the identified noise contours in the 2010 General Plan, indicating that ambient noise levels on the project site are generally below 50 dBA. As a result, the project area is not classified as conditionally acceptable or normally unacceptable for any land use category as shown in Figure 4.10-1 in Section 4.10, *Noise*.

Table 4.9-2
Policy Consistency: Monterey County 2010 General Plan

Monterey County General Plan Policy	Consistency Discussion
S-7.8: All discretionary projects that propose to use heavy construction equipment that has the potential to create vibrations that could cause structural damage to adjacent structures within 100 feet shall be required to submit a pre-construction vibration study prior to the approval of a building permit. Projects shall be required to incorporate specified measures and monitoring identified to reduce impacts. Pile driving or blasting are illustrative of the type of equipment that could be subject to this policy. **S-7.9:** No construction activities pursuant to a County permit that exceed "acceptable" levels listed in Policy S-7.1 [shown in Table S-2 of the General Plan] shall be allowed within 500 feet of a noise sensitive land use during the evening hours of Monday through Saturday, or anytime on Sunday or holidays, prior to completion of a noise mitigation study. Noise protection measures, in the event of any identified impact, may include but not be limited to: • Constructing temporary barriers, or • Using quieter equipment than normal. **S-7.10:** Construction projects shall include the following standard noise protection measures: • Construction shall occur only during times allowed by ordinance/code unless such limits are waived for public convenience; • All equipment shall have properly operating mufflers; and Lay-down yards and semi-stationary equipment such as pumps or generators shall be located as far from noise-sensitive land uses as practical.	**Potentially Significant.** As noted in Section 4.10, *Noise*, the closest sensitive receptors could be as close as 50 feet from grading activities, 70 feet from house construction, and 170 to 200 feet from construction of the internal looped roadway. In addition, any new residences constructed and occupied prior to completion of all on-site construction would also be located in close proximity to construction activities. Implementation of Mitigation Measures N-1 (a) through N-1(e) would be required to reduce construction noise impacts to a less than significant level. With the implementation of these mitigation measures, the project would be consistent with this policy.
Public Services Element	
PS-1.1: Adequate Public Facilities and Services (APFS) requirements shall: a. Ensure that APFS needed to support new development are available to meet or exceed the level of service of "Infrastructure and Service Standards" (Table PS-1) concurrent with the impacts of such development; b. Encourage development in infill areas where APFS are available, while acknowledging the rights of property owners to economically viable use of existing legal lots of record throughout the county; and c. Seek to achieve acceptable level of service (LOS) standards through improvements funded by fair share impact fees and planned capital improvements (CIFPs). **PS-1.3:** No discretionary application for new development shall be approved unless the County finds that APFS for that use exist or will be provided	**Consistent.** The proposed project would meet APFS Rural Standards, as outlined in Table PS-1 in the General Plan Public Services Element. The list below lists each applicable APFS standard and discusses the project's consistency. a. Emergency Response: As noted in Section 4.12, *Public Services*, the Cypress Fire Protection District's average response time in the jurisdiction is five minutes, while the response time to the project site would be from two to three minutes. This exceeds the 45 minute response time required in Table PS-1. b. Road Intersection Level of Service: The analysis in Section 4.14, *Transportation and Circulation*, utilizes a LOS D standard for County facilities, where appropriate. While impacts to some intersections would be potentially significant, the project applicant would be required to pay applicable traffic impact fees, consistent with this policy. c. Water: As described in Section 4.15, *Utilities*, a

Table 4.9-2
Policy Consistency: Monterey County 2010 General Plan

Monterey County General Plan Policy	Consistency Discussion
concurrent with the development.	Community Water System (CWS) sourced from two existing on-site wells would supply domestic and irrigation water for the project. As described in Section 4.8, *Hydrology and Water Quality,* the project's net consumptive demand for water would be below existing conditions, such that a proven long term water supply would be available. d. Sanitation: The proposed project would connect to the existing CAWD treatment plant. e. Solid Waste: Solid waste collection and disposal would be carried out by private hauler Waste Management. f. Park/Schools: As noted in Section 4.12, *Public Services,* adequate school facilities are available to serve the project. In addition, the project applicant would be required to pay development impact fees that would be used for park facility maintenance or development of new park facilities at sites identified by the CVMP. g. Stormwater and Drainage: Compliance with existing regulations and implementation of mitigation measures identified in Section 4.8, *Hydrology and Water Quality,* would ensure that post-development, off-site peak flow drainage from the project site would not be greater than pre-development peak flow drainage. Based on the above analysis, APFS would be available to the site, consistent with this policy.
PS-2.3: New development shall be required to connect to existing water service providers where feasible. Connection to public utilities is preferable to other providers.	**Consistent.** A CWS sourced from two existing on-site wells would supply domestic and irrigation water for the project. While this is a new water service provider, as noted in Section 4.8, *Hydrology and Water Quality,* adequate groundwater is available to serve the project, which may not be the case with existing water service providers in the area. Therefore, a new CWS is preferable, and the project would be consistent with this policy.
PS-2.8: The County shall require that all projects be designed to maintain or increase the site's pre-development absorption of rainfall (minimize runoff), and to recharge groundwater where appropriate. Implementation shall include standards that could regulate impervious surfaces, vary by project type, land use, soils and area characteristics, and provide for water impoundments (retention/detention structures), protecting and planting vegetation, use of permeable paving materials, bioswales, water gardens, and cisterns, and other measures to increase runoff retention, protect water quality, and enhance groundwater recharge.	**Consistent.** Mitigation identified in Section 4.9, *Hydrology and Water Quality*, would require that post-development, off-site peak flow drainage from the project site would not be greater than pre-development peak flow drainage. Mitigation would also require that stormwater control measures be developed to maximize on-site infiltration of stormwater and minimize off-site stormwater discharge. With this mitigation, the project would be consistent with this policy.
PS-3.1: Except as specifically set forth below, new development for which a discretionary permit is required, and that will use or require the use of water, shall be prohibited without proof, based on specific findings and supported by evidence, that	**Consistent.** As discussed in the *Carmel Rio Road EIR – Groundwater Supply Technical Report* (Todd Groundwater, August 2016) and summarized in Section 4.8, *Hydrology and Water Quality,* the proposed project would have a long-term,

Table 4.9-2
Policy Consistency: Monterey County 2010 General Plan

Monterey County General Plan Policy	Consistency Discussion
there is a long-term, sustainable water supply, both in quality and quantity to serve the development.	sustainable water supply. The factor most relevant to the project is "cumulative impacts of existing and projected future demand for water from the source, and the ability to reverse trends contributing to an overdraft condition or otherwise affecting supply." The source for the Carmel Rio project is the Carmel Valley Alluvial Aquifer (CVAA). The CVAA has not been declared to be in overdraft. Groundwater levels still recover to a "full" level by the end of winter in most years. However, groundwater extractions during the rest of the year deplete Carmel River base flow and adversely impact fish. A single development project cannot be expected to reverse a regional historical trend caused by all pumpers in the valley. However, it can be expected to contribute its share toward reversing the adverse condition. It is the role of local water management agencies to determine how much an individual project needs to contribute toward a collective solution, based on analysis that evaluates the cumulative effect of many projects on the hydrologic system. Toward that end, Monterey Peninsula Water Management District's Water Supply Planning Committee developed draft Ordinance 175, which will change how baseline production would be set for new development. New Rule 40-A 4 would require reduction in consumptive use for new development that depends on the Carmel River for water supply. For this project, the system capacity (production limit) is determined by seventy-five percent (75%) of the existing consumptive use on the site as adjusted for the new project's consumptive use; the remaining 25% is for environmental benefits. MPWMD considered the first reading of draft Ordinance 175 in October 2016, and will consider the second reading of the draft ordinance in November 2016. The simulated net consumptive use for the project with the applicant's proposed landscape vegetation would be 53% of the baseline amount and therefore would comply with local water management policies. The plant factor could be increased to as much as 0.74 while still meeting this target. Therefore, the project would be consistent with this policy.
PS-4.2: Developers shall construct or contribute their fair share to the funding of new or expanded wastewater treatment facilities needed to serve their development.	**Consistent.** As described in Section 2.0, *Project Description*, the project is currently outside the CAWD service area; however, CAWD is processing a regional annexation at the mouth of the Carmel Valley, including the project site. The application for annexation was approved by the Local Agency Formation Commission Board on June 27, 2016 and a resolution was adopted in August 2016. Implementation of Mitigation Measure U-2, as described in Section 4.15, *Utilities,* would require the

Table 4.9-2
Policy Consistency: Monterey County 2010 General Plan

Monterey County General Plan Policy	Consistency Discussion
	applicant to construction a new, off-site sewer line in order to connect the proposed project with the existing CAWD sewer system. The project applicant would be responsible for installing the new sewer line, consistent with this policy.
PS-13.2: All new utility lines shall be placed underground, unless determined not to be feasible by the Director of the Resource Management Agency.	**Consistent.** As shown on Figure 2-5 in Section 2.0, *Project Description*, all new utility lines would be installed below ground; therefore the project is consistent with this policy.
Agriculture Element	
AG-1.1: Land uses that would interfere with routine and ongoing agricultural operations on viable farmlands designated as Prime, of Statewide Importance, Unique, or of Local Importance shall be prohibited.	**Consistent.** The California Department of Conservation, Important Farmland maps (2012) designate the project site as Grazing Land. Adjacent land is designated either Grazing Land or Urban and Built-Up Land. Because the project would not interfere with agricultural operations on farmlands designated as Prime, of Statewide Importance, Unique, or of Local Importance, it would be consistent with this policy.

Table 4.9-3
Policy Consistency: Carmel Valley Master Plan

Carmel Valley Master Plan Supplemental Policies	Consistency Discussion
1.0 Land Use	
CV-1.1: All policies, ordinances, and decisions regarding Carmel Valley shall be consistent with the goal of preserving Carmel Valley's rural character. In order to preserve the rural character of Carmel Valley, development shall follow a rural architectural theme with design review.	**Consistent.** As discussed in Section 4.1, *Aesthetics,* the proposed residences would maintain the rural character of the area and would be consistent with nearby residential development. In addition, the project site is zoned LDR/1-D-S-RAZ and is subject to Title 21 Section 21.44, Regulations for Design Control Zoning Districts, or D Districts. Design Approval - the review and approval of the exterior appearance, location, size, materials, and colors or proposed structures - would be required. The purpose of Design Approval is to assure protection of the public viewshed, neighborhood character, and to assure the visual integrity of development. Design approval would further ensure that the project retains the rural character of Carmel Valley, consistent with this policy.
CV-1.5: In the residential areas, maximum densities are as shown on the Carmel Valley Master Plan Land Use Map. However, attainment of maximum density in these areas is dependent upon conformity of the proposed project to plan goals and policies.	**Consistent.** See discussion under Policy CV-1.10, below.
CV-1.6: New residential subdivisions in Carmel Valley shall be limited to creation of 190 new units (see a through g).	**Consistent.** The proposed project would facilitate the construction of 31 new units. Since adoption of this policy, five units have been constructed and 24 units have been reserved, leaving a potential buildout of 161 additional units. As shown in Table 3-1 in Section 3.0, *Environmental Setting,* an additional 281 units are proposed as part of the Rancho

Table 4.9-3
Policy Consistency: Carmel Valley Master Plan

Carmel Valley Master Plan Supplemental Policies	Consistency Discussion
	Canada Villages Project and 120 units are proposed as part of the Carmel Valley Affordable Housing Project. If all these units are constructed, buildout would exceed the new units allowed by Policy CV-1.6. However, the project itself would fit within the identified unit cap, and would therefore be consistent with this policy.
CV-1.10: The Val Verde Drive area is planned for residential use at a basic density of one (1) unit per acre. With suitable clustering, up to two (2) units per acre may be allowed. However, a density of up to four (4) units per acre may be allowed provided that at least 25% of the units are developed for individuals of low and moderate income or for workforce housing. This policy is intended to be independent from Policy CV-1.11, and not counted in conjunction with the density bonus identified in that policy.	**Consistent.** The project would include 24 market rate housing lots and one inclusionary housing lot, which would be developed with seven affordable units. As proposed, the affordable units comprise approximately 22.6% of the total of 31 units. In addition, the proposed market rate portion of the project would be developed at a gross density of 3.42 units per acre (24 units/7 acres), while the proposed inclusionary lot would be developed at a gross density of 7.69 units per acre (7 units/0.91- acre). As proposed, less than 25% of the proposed units would be developed for low and moderate income or workforce housing, and the inclusionary density would exceed the allowable four units/acre density. The proposed project includes a Zoning Ordinance Amendment that would add clarification to County Code Section 21.14.05A to allow an exception to exceed the four unit/acre lot density limit for the purpose of affordable housing. Pursuant to approval of this amendment, the project would not conflict with the allowable density requirement. In addition, to meet the 25% requirement outlined in Policy CV-1.10, the applicant would need to provide 7.75 units for low and moderate income or affordable housing. Rather than provide a fraction of a unit, the applicant would be responsible for paying an in-lieu fee of $206,544 to contribute to the provision of housing for low and moderate income households consistent with Section 18.40.090(A)(3) of the Monterey County Code. By paying the in-lieu fee for the fraction of a unit, the project would provide the required 25% of inclusionary housing, consistent with this policy.
CV-1.20: Design ("D") and site control ("S") overlay district designations shall be applied to the Carmel Valley area. Design review for all new development throughout the Valley, including proposals for existing lots of record, utilities, heavy commercial, and visitor accommodations, but excluding minor additions to existing development where those changes are not conspicuous from outside of the property, shall consider the following guidelines: a. Proposed development encourages and furthers the letter and spirit of the Master Plan. b. Development either shall be visually compatible with the character of the valley and immediate surrounding areas or shall enhance the quality of areas that have been degraded by existing development.	**Consistent.** The project applicant would be required to submit and receive approval of a Design Approval Application and a Site Plan Approval Application, in accordance with this policy. In addition, as described in Section 4.1, *Aesthetics,* the proposed project would be visually compatible with the surrounding area. The architecture of the proposed residences would preserve the rural character of the site with the low roofs and single family homes with ample connection to the outside with windows, patios, and balconies. Further, the subtle color pallet of red roofs and grey exterior walls would not distract from the rural setting of adjacent properties. The project would not disrupt views from nearby public viewing areas or adjacent residences. Due to the relatively flat topography, the project would require minimal

Table 4.9-3
Policy Consistency: Carmel Valley Master Plan

Carmel Valley Master Plan Supplemental Policies	Consistency Discussion
c. Materials and colors used in construction shall be selected for compatibility with the structural system of the building and with the appearance of the building's natural and man-made surroundings. d. Structures should be controlled in height and bulk in order to retain an appropriate scale. e. Development, including road cuts as well as structures, should be located in a manner that minimizes disruption of views from existing homes. f. Minimize erosion and/or modification of landforms. g. Minimize grading through the use of step and pole foundations.	grading, thus minimizing erosion and modification of landforms. As such, the project would be consistent with this policy.
2.0 Circulation	
CV-2.1: Public transit should be explored as an alternative to the use of private automobiles and to help preserve air quality. Whenever feasible all new development shall include a road system adequate not only for its internally generated automobile traffic but also for bus (both transit and school), pedestrian, and bicycle traffic, which should logically pass through or be generated by the development.	**Consistent.** As discussed in Section 4.14, *Transportation and Circulation*, the project is located in close proximity to a wide variety of public-serving businesses, many located within an eight to eighteen minute walk of the proposed project. Additionally, there are four transit stops in the project area, providing access to Countywide public transportation. The project would include one looped road with two entrances to Val Verde Drive, which would only serve project residences. Due to the low traffic volume on this road, it would be suitable for pedestrian and bicycle traffic. Therefore, the project would be consistent with this policy.
CV-2.7: Off-street parking should be developed at suitable locations within development areas.	**Consistent.** The proposed Site Plan, as shown in Figure 2-3 in Section 2.0, *Project Description,* identifies 12 off-street parking spaces for the seven inclusionary units. The market rate units would each include a two-car garage, as shown in the preliminary architectural renderings in Figure 2-4(a) in Section 2.0, *Project Description*. As off-street parking would be developed in close proximity to each of the proposed units, the project would be consistent with this policy.
3.0 Conservation/Open Space	
CV-3.3: Development (including buildings, fences, signs, and landscaping) shall not be allowed to significantly block views of the viewshed, the river, or the distant hills as seen from key public viewing areas such as Garland Ranch Regional Park, along Carmel Valley Road, and along Laureles Grade Road. This policy applies to commercial and private parcels including existing lots of record. Removal of existing solid fences and rows of Monterey pine trees that block views of the river and the mountains shall be encouraged.	**Consistent.** As described in Section 4.1, *Aesthetics,* and as demonstrated in the Visual Impact Study (refer to Appendix B), views of the project site from Carmel Valley Road are limited. No vistas of the Carmel River or the distant hills from Carmel Valley Road would be hindered by the proposed project. The project site is not visible from Garland Ranch Regional Park or Laureles Grade Road. The project would not remove existing solid fences or rows of Monterey pine trees. Therefore, the project would be consistent with this policy.

Table 4.9-3
Policy Consistency: Carmel Valley Master Plan

Carmel Valley Master Plan Supplemental Policies	Consistency Discussion
CV-3.8: Development shall be sited to protect riparian vegetation, minimize erosion, and preserve the visual aspects of the Carmel River. In places where the riparian vegetation no longer exists, it should be planted to a width of 150 feet from the river bank, or the face of adjacent bluffs, whichever is less. Density may be transferred from this area to other areas within a lot.	**Consistent.** The Carmel River is located approximately 1,050 feet south of the project site. At this distance, the project would not modify or disrupt riparian vegetation, nor would it cause erosion or otherwise degrade the visual aspects of the river. Therefore, the project would be consistent with this policy.
CV-3.10: Predominant landscaping and erosion control material shall consist of plants native to the valley that are similar in habitat, form, and water requirements. The following guidelines shall apply for landscape and erosion control plans: a. Existing native vegetation should be maintained as much as possible throughout the valley. b. Valley oaks should be incorporated on floodplain terraces. c. Weedy species such as pampas grass and genista shall not be planted in the Valley. d. Eradication plans for weedy species shall be incorporated. e. The chaparral community shall be maintained in its natural state to the maximum extent feasible in order to preserve soil stability and wildlife habitat and also be consistent with fire safety standards.	**Consistent.** As noted in Section 2.0, *Project Description,* existing vegetation on the site would be removed, and the project would incorporate native and drought tolerant landscaping. However, detailed landscaping plans have not yet been prepared. Section 18.44.040 of the Monterey County Code requires submittal of a landscape plan for review and approval by the Director of Building Inspection in conformity with the landscape guidelines adopted by the Board of Supervisors. The landscape plan review would include a consistency review with Policy CV-3.10. As the project landscaping would be reviewed for consistency with these requirements prior to approval, the project would be consistent with this policy.
CV-3.11: The County shall discourage the removal of healthy native oak and madrone and redwood trees in the Carmel Valley Master Plan Area.	**Consistent.** As described in Section 4.3, *Biological Resources*, one redwood tree has been documented within the planted mixed woodland habitat in the southeast portion of the site, which may be removed as a result of the proposed project. If removal is required, the applicant would be required to first obtain a tree removal permit as outlined in Section 21.64.260(D) of the Monterey County Code. Upon approval of the tree removal permit, the project would not conflict with this policy.
CV-3.17: Street lighting shall be designed to promote traffic safety and be unobtrusive and harmonious with the local character. Such lighting must be constructed and located to illuminate only the intended area and prevent off-site glare.	**Consistent.** Street lights on the proposed looped access road would be 15- or 20-feet tall and spaced 100 feet apart, as detailed on Figure 2-5 in Section 2.0, *Project Description.* As required by Mitigation Measure AES-1 in Section 4.1, *Aesthetics,* all street lighting is required to be downcast and low mounted to reduce light trespass onto adjacent properties. Pursuant to compliance with this mitigation measure, the project would be consistent with this policy.
CV- 3.20: A discretionary permit shall be required for new wells in the Carmel Valley alluvial aquifer. All new wells shall be required to fully offset any increase in extractions from this aquifer (see *Policies PS-3.4 and PS-3.5*). These requirements shall be maintained until such a time that the Coastal Water project (or its equivalent) results in elimination of all Cal-Am withdrawals in excess of its legal rights.	**Consistent.** A Community Water System sourced from two existing wells would supply domestic and irrigation water for the project. Both wells have historical production and water rights to the Carmel Valley Alluvial Aquifer. No new wells would be drilled. Therefore, the project would be consistent with this policy.

Table 4.9-3
Policy Consistency: Carmel Valley Master Plan

Carmel Valley Master Plan Supplemental Policies	Consistency Discussion
4.0 Safety	
CV-4.1: In order to reduce potential erosion or rapid runoff: a. The amount of land cleared at any one time shall be limited to the area that can be developed during one construction season. b. Motorized vehicles shall be prohibited on the banks or in the bed of the Carmel River, except by permit from the Water Management District or Monterey County. c. Native vegetative cover must be maintained on areas that have the following combination of soils and slope: 1. Santa Lucia shaly clay loam, 30-50% slope (SfF) 2. Santa Lucia-Reliz Association, 30-75% slope (Sg) 3. Cieneba fine gravelly sandy loam, 30-70% slope (CcG) 4. San Andreas fine sandy loam, 30-75% slope (ScG) 5. Sheridan coarse sandy loam, 30-75% slope (SoG) 6. Junipero-Sur complex, 50-85% slope (Jc)	The project would not include motorized vehicle use within the Carmel River, and does not include any of the soils and slopes listed in sub-section (c). As discussed in Section 4.8, *Hydrology and Water Quality,* the project would be required to comply with existing regulations and mitigation that all stormwater runoff during construction and operation of the proposed project be treated prior to discharge off-site to ensure that contaminated runoff does not enter the local stormwater drainage system or nearby waterbodies. Upon implementation of these measures, the amount of land cleared at any one time would be minimized, and the project would be consistent with this policy.
CV-4.3: In addition to required on-site improvements for development projects, a fee shall be imposed to help finance the improvement and maintenance of the drainage facilities identified in the Drainage Design Manual for Carmel Valley.	**Consistent.** All fees applicable to the project would be paid by the applicant.
CV-4.4: The County shall require emergency road connections as necessary to provide controlled emergency access as determined by appropriate emergency service agencies (Fire Department, OES). The County shall coordinate with the emergency service agencies to periodically update the list of such connections.	**Consistent.** As discussed in Section 4.16, *Effects Found Not to be Significant,* the project would compatible with nearby land uses and the design of the project must comply with Monterey County Department of Public Works requirements and standards for safe access, including emergency vehicle access. Therefore, the project would be consistent with this policy.
5.0 Public Services	
CV-5.1: Pumping from the Carmel River aquifer shall be managed in a manner consistent with the Carmel River Management Program. All beneficial uses of the total water resources of the Carmel River and its tributaries shall be considered and provided for in planning decisions.	**Consistent.** Refer to the General Plan Policy PS-3.1 discussion above. Net consumptive use of groundwater on the project site would be below the baseline use, such that water levels in the Carmel River would not be depleted.
CV-5.3: Development shall incorporate designs with water reclamation, conservation, and new source production in order to: a. Maintain the ecological and economic environment; b. Maintain the rural character; and c. Create additional water for the area where possible including, but not limited to, on-site stormwater retention and infiltration basins.	**Consistent.** Mitigation identified in Section 4.8, *Hydrology and Water Quality,* would require the implementation of stormwater control measures which may include, as necessary, above-ground retention basins, subsurface infiltration devices such as cisterns with permeable bottoms or perforated pipes, permeable pavement, and vegetated swales. With these measures, the project would be consistent with this policy.
CV-5.5: Parts of the Carmel Valley aquifer are susceptible to contamination from development in areas not served by a regional wastewater treatment facility. Development projects that include an on-site wastewater treatment system shall provide geologic and soils surveys that assess if conditions could	**Consistent.** The proposed project would not include an on-site wastewater treatment facility, but would instead connect to the Carmel Area Wastewater District. Therefore, the project would be consistent with this policy.

Table 4.9-3
Policy Consistency: Carmel Valley Master Plan

Carmel Valley Master Plan Supplemental Policies	Consistency Discussion
preclude or restrict the possibility of satisfactorily locating such a system where it would not pose a threat of contamination to the aquifer. New development on existing lots of record shall be carefully reviewed for proper siting and design of any conventional or alternative on-site wastewater treatment systems in accordance with standards of the Monterey County Code 15.20, the Central Coast Basin Plan and the Carmel Valley Wastewater Study.	
6.0 Agriculture	
CV-6.1: Development adjacent to agricultural lands shall be planned to minimize adverse effects on the productivity of the agricultural soils.	**Consistent:** While the project site is currently operated as row-crops, it is not designated as Prime Farmland, Farmland of Statewide Importance, or Unique Farmland, nor is the site under a Williamson Act contract. Property across Val Verde Drive to the east is similarly not designated as Important Farmland, nor zoned for agriculture or included in a Williamson Act contract. Therefore, the project would not result in adverse effects on the productivity of agricultural soils, consistent with this policy.
CV-6.3: Croplands and orchards shall be retained for agricultural use. When a parcel cannot be developed because of this policy, a low-density, clustered development may be permitted in accordance with the following guidelines: a. Development shall be located on portions of the land not in cultivation or on a portion of the land adjoining existing development in a manner that said development will not diminish the visual quality of such parcels. b. Overall density shall not exceed one (1) unit per 2.5 acres c. New residential units shall be sited on one-third (1/3) of the property or less. d. Required agriculturally related structures and housing for workers of that parcel may be allowed on the property in a manner that does not diminish the visual quality of the open space.	**Consistent:** As noted in Section 4.16, *Effects Found Not to be Significant,* while the project site is currently operated as row-crops, it is not designated as Prime Farmland, Farmland of Statewide Importance, or Unique Farmland, nor is the site under a Williamson Act contract. Therefore, the project would not result in impacts to agricultural resources, and would be consistent with this policy.

Policy Consistency. As shown in Tables 4.9-2 and 4.9-3, the proposed project is considered consistent with the relevant polices of the 2010 General Plan and the CVMP. The CVMP designates the Val Verde Drive area as residential land use.

The project site is zoned for low density residential (LDR/1-D-S-RAZ), however is subject to CVMP Policy CV-1.10, which allows a density of up to four units per acre if 25% of the units are developed for individuals of low and moderate income or for workforce housing. The project would include 24 market rate housing lots (3.42 units per acre) and one inclusionary housing lot (7.69 units per acre), which would be developed with seven affordable units. As proposed, the affordable units comprise approximately 22.6% of the total of 31 units. As proposed, less than 25% of the proposed units would be developed for low and moderate income or workforce housing, and the inclusionary density would exceed the allowable four units/acre density. However, the proposed project includes a Zoning Ordinance Amendment that would add

clarification to County Code Section 21.14.05A to allow an exception to exceed the four unit/acre lot density limit for the purpose of affordable housing. Pursuant to the approval of this amendment, the project would not conflict with the allowable density requirement. In addition, to meet the 25% requirement outlined in Policy CV-1.10, the applicant would need to provide 7.75 units for low and moderate income or affordable housing. Rather than provide a fraction of a unit, the applicant would be responsible for paying an in-lieu fee of $206,544 to contribute to the provision of housing for low and moderate income households consistent with Section 18.40.090(A)(3) of the Monterey County Code and as outlined in the Settlement Agreement. By paying the in-lieu fee for a fraction of a unit, the project would provide the required 25% of inclusionary housing, consistent with CVMP Policy CV-1.10.

As summarized in Tables 4.9-2 and 4.9-3, the project is consistent with CVMP and General Plan policies related to land use, conservation and open space, safety, aesthetics, agriculture, air quality, hazards, and noise. In addition, the project would have a long-term, sustainable water supply, consistent with General Plan Policy PS-3.1.

The determination of General Plan and CVMP consistency is within the discretion of the County Board of Supervisors. In making this determination, the applicable law requires the decision makers to view the project at issue against the General Plan as a whole, and does not permit the elevation of certain specific General Plan policies over others. The project is consistent with the General Plan goals and policies as shown in Table 4.9-2 and Table 4.9-3. Therefore, impacts related to policy consistency would not be significant.

As noted previously, the above discussion is intended to guide policy interpretation, but is not intended to replace or supplant County decision-makers. The final determination of consistency will be made by County decision-makers when they act on the proposed project.

Mitigation Measures. Mitigation measures identified throughout this EIR would serve to reduce identified environmental impacts and further improve consistency of the project with certain General Plan policies. However, no specific mitigation for this impact is required.

Significance After Mitigation. With implementation of mitigation measures identified throughout this EIR, impacts would be reduced to a less than significant level.

b. Cumulative Impacts. Land use impacts would be cumulatively considerable if the proposed project, in conjunction with other past, present and reasonably foreseeable projects, would trigger the above-referenced significance thresholds.

At the time of preparation of this analysis, it was not known whether the other cumulative projects would be inconsistent with adopted land use plans and ordinances. However, as implementation of future projects would require discretionary approval, consistent with the proposed project's review and approval process, it is reasonably assumed that these projects would be designed or otherwise conditioned to maximize consistency with adopted land use plans and ordinances. As such, cumulative land use impacts are anticipated to be less than significant.

As described in Tables 4.9-2 and 4.9-3, the proposed project is consistent with applicable land use goals, policies and objectives of the General Plan and CVMP. All feasible mitigation measures to address environmental impacts of the project have been required and are detailed in Sections 4.1 to 4.8 and Sections 4.10 to 4.15 of this EIR. Given the project's consistency as well as the potential for other projects in the cumulative impact scenario to be generally consistent with the land use policy framework, overall cumulative land use impacts are anticipated to be less than significant. As described above, the County seeks to balance the General Plan resource protection goals and policies with its goals and policies regarding economic development and urban growth, by directing growth to appropriate areas. The project site is located in an urbanized area in the Mouth of the Valley. Proximate to the project site, adjacent land uses include rural density single-family residences to the north and south, and existing commercial use buildings and parking lots to the west. Ongoing cumulative development in this area could be determined to be generally consistent with the overall vision and policy direction of the General Plan. Therefore, the project would not contribute to an identified significant cumulative land use impact.

4.10 NOISE

4.10.1 Summary

Table 4.10-1 summarizes the identified environmental impacts, proposed mitigation measures, and residual impacts of the proposed project with regard to noise. Additional detail is provided in Section 4.10.3 (Impact Analysis).

Table 4.10-1
Impact and Mitigation Summary: Noise

Impact	Mitigation Measures	Residual Impact
Impact N-1 Noise from demolition of existing structures, excavation and grading, and construction of the project and associated infrastructure has the potential to adversely impact existing and future nearby residences. Impacts would be Class II, significant but mitigable.	**N-1(a) Construction Equipment**. Construction equipment shall be properly maintained and all internal combustion engine driven machinery with intake and exhaust mufflers and engine shrouds, as applicable, shall be in good condition and appropriate for the equipment. Equipment engine shrouds shall be closed during equipment operation. Whenever feasible, electrical power shall be used to run air compressors and similar power tools rather than diesel equipment. The developer shall require all contractors, as a condition of contract, to maintain and tune-up all construction equipment to minimize noise emissions. **N-1(b) Vehicle and Equipment Idling**. Construction vehicles and equipment shall not be left idling for longer than five minutes when not in use. **N-1(c) Stationary Equipment**. Stationary construction equipment that generates noise that exceeds 60 dBA Leq at the boundaries of the nearby residential uses shall be shielded. Temporary noise barriers used during construction activity shall be made of noise-resistant material sufficient to achieve a Sound Transmission Class (STC) rating of STC 40 or greater, based on sound transmission loss data taken according to ASTM Test Method E90. Such a barrier may provide as much as a 10 dB insertion loss, provided it is positioned as close as possible to the noise source or to the receptors. To be effective, the barrier must be long and tall enough (a minimum height of eight feet) to completely block the line-of-sight between the noise source and	Implementation of Mitigation Measures N-1(a) through N-1(e) would reduce construction noise impacts to a less than significant level.

Table 4.10-1
Impact and Mitigation Summary: Noise

Impact	Mitigation Measures	Residual Impact
	the receptors. The gaps between adjacent panels must be filled-in to avoid having noise penetrate directly through the barrier. The recommended minimum noise barrier or sound blanket requirements would reduce construction noise levels by at least 10 dB. The equipment area with appropriate acoustical shielding shall be designated on building and grading plans. Equipment and shielding shall remain in the designated location throughout construction activities. Prior to issuance of grading permits, the project proponent shall submit building and grading plans that show the appropriate construction equipment noise reduction measures to the RMA – Planning Department. Compliance shall be monitored by County Building Inspectors. **N-1(d) Workers' Radios**. All noise from workers' radios shall be controlled to a point that they are not audible at sensitive receptors near the construction activity. **N-1(e) Disturbance Coordinator**. A noise disturbance coordinator shall be designated by the contractor. The noise disturbance coordinator shall be responsible for responding to any local complaints about construction noise. The noise disturbance coordinator shall determine the cause of the noise complaint (e.g., starting too early, bad muffler, etc.) and shall require that reasonable measures warranted to correct the problem be implemented. A telephone number for the disturbance coordinator shall be conspicuously posted at the construction site.	

Table 4.10-1
Impact and Mitigation Summary: Noise

Impact	Mitigation Measures	Residual Impact
Impact N-2 Construction-related activities associated with the proposed project would intermittently generate groundborne vibration on and adjacent to the site. This may affect existing off-site receptors near the project site and proposed on-site residences, but would not create vibrations that could cause structural damage to adjacent structures within 100 feet of the project site. Impacts would be Class III, less than significant.	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact N-3 Occupants of proposed on-site and existing off-site residential units would not experience noise level increases exceeding applicable thresholds as a result of project-generated traffic on Highway 1, Carmel Valley Road, Val Verde Drive, Rio Road, or Carmel Rancho Boulevard. Project-generated traffic would have a less than significant impact on exterior and interior noise levels at existing and proposed sensitive receptors on Val Verde Drive. Impacts would be Class III, less than significant.	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact N-4 The proposed residential uses would be subject to operational noise generated from existing commercial operations west of the site, as well as noise generated from outdoor activities and operations on nearby school playgrounds. However, noise generated by these uses would not exceed applicable standards. The project would also generate additional noise from operation of the proposed residential uses. These noise impacts would not cause the applicable standards to be exceeded for any nearby uses. Impacts would be Class II, *less than significant*.	No mitigation is required.	Impacts would be less than significant without mitigation.

4.10.2 Environmental Setting

a. Overview of Noise. Noise level (or volume) is generally measured in decibels (dB) using the A-weighted sound pressure level (dBA). The A-weighting scale is an adjustment to the actual sound pressure levels to be consistent with that of human hearing response, which is most sensitive to frequencies around 4,000 Hertz (about the highest note on a piano) and less sensitive to low frequencies (below 100 Hertz).

Sound pressure level is measured on a logarithmic scale with the 0 dB level based on the lowest detectable sound pressure level that people can perceive (an audible sound that is not zero sound pressure level). Based on the logarithmic scale, a doubling of sound energy is equivalent to an increase of 3 dBA, and a sound that is 10 dBA less than the ambient sound level has no effect on ambient noise. Because of the nature of the human ear, a sound must be about 10 dBA greater than the reference sound to be judged as twice as loud. In general, a 3 dBA change in community noise levels is noticeable, while 1-2 dB changes generally are not perceived. Quiet suburban areas typically have noise levels in the range of 40-50 dBA, while arterial streets are in the 50-60+ dBA range. Normal conversational levels are in the 60-65 dBA range, and ambient noise levels greater than 65 dBA can interrupt conversations.

Noise levels typically attenuate (or drop off) at a rate of 6 dBA per doubling of distance from point sources (such as industrial machinery). Noise from lightly traveled roads typically attenuates at a rate of about 4.5 dBA per doubling of distance. Noise from heavily traveled roads typically attenuates at about 3 dBA per doubling of distance. Noise levels may also be reduced by intervening structures; generally, a single row of buildings between the receptor and the noise source reduces the noise level by about 5 dBA, while a solid wall or berm reduces noise levels by 5 to 10 dBA. The manner in which older homes in California were constructed (approximately 30 years old or older) generally provides a reduction of exterior-to-interior noise levels of about 20 to 25 dBA with closed windows. The exterior-to-interior reduction of newer residential units and office buildings is generally 30 dBA or more (FTA, 2006).

In addition to the actual instantaneous measurement of sound levels, the duration of sound is important since sounds that occur over a long period of time are more likely to be an annoyance or cause direct physical damage or environmental stress. One of the most frequently used noise metrics that considers both duration and sound power level is the equivalent noise level (Leq). The Leq is defined as the single steady A-weighted level that is equivalent to the same amount of energy as that contained in the actual fluctuating levels over a period of time (essentially, the average noise level). Typically, Leq is summed over a one-hour period. Lmax is the highest RMS (root mean squared) sound pressure level within the measuring period, and Lmin is the lowest RMS sound pressure level within the measuring period.

The time period in which noise occurs is also important since noise that occurs at night tends to be more disturbing than that which occurs during the day. Community noise is usually measured using Day-Night Average Level (Ldn), which is the 24-hour average noise level with a 10-dBA penalty for noise occurring during nighttime (10 p.m. to 7 a.m.) hours, or Community Noise Equivalent Level (CNEL), which is the 24-hour average noise level with a 5 dBA penalty for noise occurring from 7 p.m. to 10 p.m. and a 10 dBA penalty for noise occurring from 10 p.m. to 7 a.m. Noise levels described by Ldn and CNEL usually do not differ by more than 1 dB.

b. Fundamentals of Groundborne Vibration. Vibration is sound radiated through the ground. The rumbling sound caused by the vibration of room surfaces is called groundborne noise. The ground motion caused by vibration is measured as particle velocity in inches per second and, in the U.S., is referenced as vibration decibels (VdB).

The background vibration velocity level in residential areas is usually around 50 VdB. The vibration velocity level threshold of perception for humans is approximately 65 VdB. According

to the Federal Transit Administration *Transit and Noise Vibration Impact Assessment* (May 2006), a vibration velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels for many people. Most perceptible indoor vibration is caused by sources within buildings, such as operation of mechanical equipment, movement of people, or the slamming of doors. Typical outdoor sources of perceptible groundborne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the groundborne vibration from traffic is rarely perceptible. The range of interest is from approximately 50 VdB, which is the typical background vibration velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings. The general human response to different levels of groundborne vibration velocity levels is described in Table 4.10-2.

Table 4.10-2
Human Response to Different Levels of Groundborne Vibration

Vibration Velocity Level	Human Reaction
65 VdB	Approximate threshold of perception for many people.
75 VdB	Approximate dividing line between barely perceptible and distinctly perceptible. Many people find transit vibration at this level annoying.
85 VdB	Vibration acceptable only if there are an infrequent number of events per day.
90 VdB	Difficulty with tasks such as reading computer screens.

Source: FTA, 2006

c. Sensitive Receptors. Noise exposure goals for various types of land uses reflect the varying noise sensitivities associated with each of these uses. The County of Monterey 2010 General Plan Noise Element, which is contained in the General Plan Safety Element, identifies normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable noise levels for a variety of land use and development types, based on the Office of Planning and Research (OPR) General Plan Guidelines. The most noise sensitive land uses include residences, hotels, schools, libraries, churches, hospitals, and nursing homes. Sensitive receptors near the project site include those on land adjacent to the north, south, and east side designated Low Density Residential that currently have existing residences or could in the future. The existing residences are located 50 feet from the northern and southern project site boundaries.

d. Existing Noise Levels. The proposed project would be built and operated on an approximately 7.9-acre parcel that would be subdivided into 25 lots. The general noise environment of the project area is characterized by open space, rural residential, or agricultural uses with low ambient noise levels during the evening and nighttime hours. The primary ambient sources of noise on the project site and in the surrounding area include wind and fauna such as birds and small mammals. Noise generators during the day include those typically associated with minor agricultural activities and local passenger and heavy-duty truck traffic along the nearest major roadways to the project site: Carmel Valley Road, located 1,050 feet to

the north; State Route (Highway) 1, located 1,370 feet to the west; and Carmel Rancho Boulevard, located 180 feet to the west. Rio Road and Val Verde Drive are the two local roads providing access to the site. Rio Road is located 300 feet south of the site and connects to Val Verde Drive, a private drive that runs adjacent to the project's eastern boundary. These two roadways carry limited traffic and therefore are not substantial sources of noise. Motor vehicle noise can be of concern because it is characterized by a high number of individual events, which often create a sustained noise level.

Land forms and man-made structures have complex effects on sound transmission and on noise contours. Generally, barriers between a source and receiver absorb or reflect noise resulting in a quieter environment. Where barriers or land forms do not interrupt the noise transmission path from source to receiver, the contours prove to be good estimates of the average noise level from roadway traffic. In areas where barriers or land forms interrupt the sound transmission, the noise contours overestimate the extent to which a source intrudes into the community. The Monterey County General Plan noise contour distances, as shown in Figure 10C in the General Plan, depict worst-case conditions because they do not account for any obstructions to the noise path, such as walls, berms, or buildings.

The County of Monterey 2010 General Plan Noise Element provides existing and projected noise contours associated with airports, stationary sources, and roadway sources, which provide a visualization of estimates of sound level. The project site is not within any identified noise contour in the 2010 General Plan for Highway 1, Carmel Valley Road, Carmel Rancho Boulevard, or Rio Road, indicating that ambient noise levels on the project site are generally below 50 dBA. Noise measurements taken at the site, shown in Table 4.10-3, indicated similar levels.

Table 4.10-3
Sound Level Measurement Results (dBA)

Measurement Location	Primary Noise Source	Sample Time	Leq Measured	Lmax	Lmin
Station A: Fifteen feet west of Val Verde Drive, approximately 200 feet south of northern boundary	Vehicle traffic on Val Verde Drive, Carmel Valley Road, and Highway 1	11/14/2015 4:25 p.m.– 4:40 p.m.	49.4	63.0	43.7
Station B: Twenty-five feet from western boundary, approximately 200 feet south of northern boundary	Vehicle traffic on Carmel Rancho Blvd. and adjacent parking lot	11/14/2015 4:50 p.m.– 5:05 p.m.	49.4	59.4	45.6

Source: Field visit using ANSI Type II Integrating sound level meter.
See Appendix H for sound level measurement data sheets

e. Regulatory Setting.

Federal. Under the Occupational Safety and Health Act of 1970 (29 U.S.C. §651 et seq.), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) adopted regulations (29 CFR §1910.95) designed to protect workers against the effects of occupational noise exposure. These regulations list limits on noise exposure levels as a function of the amount of time during which the worker is exposed, as shown in Table 4.10-4.

The regulations further specify requirements for a hearing conservation program (§1910.95(c)), a monitoring program (§1910.95(d)), an audiometric testing (i.e., test of hearing ability) program (§1910.95(g)), and hearing protection (§1910.95(i)). There are no federal laws governing community noise.

Table 4.10-4
OSHA Permissible Noise Exposure Standards

Duration of Noise (Hours/Day)	A-Weighted Noise Level (dBA)
8	90
6	92
4	95
3	97
2	100
1.5	102
1	105
0.5	110
0.25 or less	115

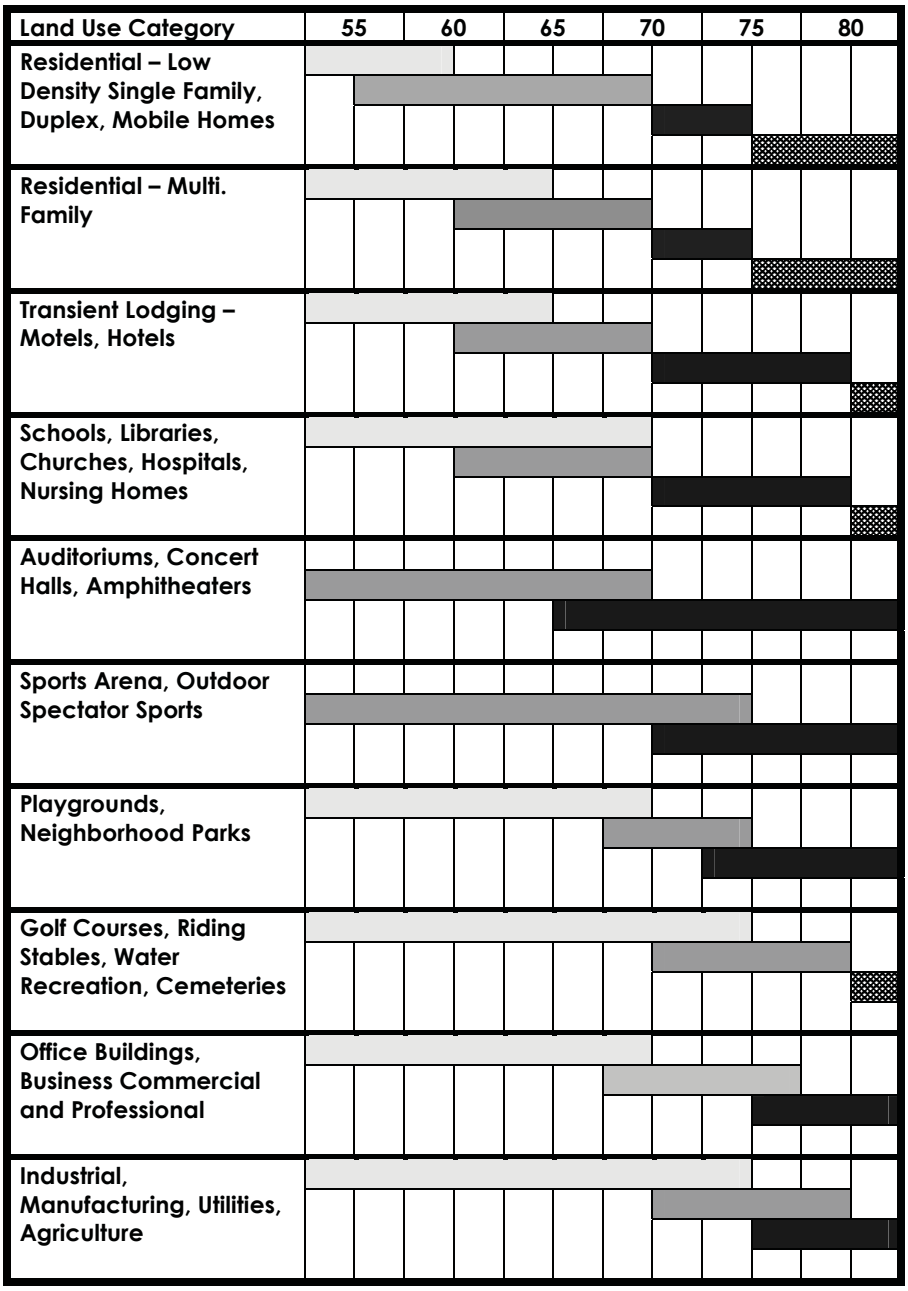
Source: 29 CFR §1910.95, Table G-16.

State. California Government Code §65302 encourages each local government entity to implement a noise element as part of its general plan. In addition, OPR has developed guidelines for preparing noise elements, which include recommendations for evaluating the compatibility of various land uses as a function of community noise exposure.

County of Monterey. The County of Monterey 2010 General Plan Noise Element identifies normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable noise levels for a variety of land use and development types, based on OPR General Plan Guidelines. Figure 4.10-1 shows the County of Monterey community noise exposure levels.

The County of Monterey 2010 General Plan Noise Element also includes policies that are designed to meet General Plan Goal S-7, to "maintain a healthy and quiet environment free from annoying and harmful sounds." These policies address requirements for new noise-sensitive land uses, development in areas that may be exposed to high levels of noise, construction of new noise-generating uses, procedures for acoustical analysis and environmental review, regulations for construction activity and the use of heavy construction equipment, and standard noise protection measures for new construction.

In addition to applicable General Plan policies, Title 24 of the California Health and Safety Code establishes an interior noise standard of 45 dBA for residential units.



INTERPRETATION:

Normally Acceptable
Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

Conditionally Acceptable
New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply or air conditioning will

Normally Unacceptable
New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

Clearly Unacceptable
New construction or development should generally not be undertaken.

Monterey County Community Noise Exposure Ldn or CNEL, dB

Source: 2010 Monterey County General Plan

Figure 4.10-1

The Monterey County Code, Chapter 10.60 – Noise Control, also regulates noise. Section 10.60.010 states, "This Board finds that noises generated so as to be in excess of the levels permitted in this Chapter impair hearing, impede convalescence, hinder concentrated mental effort, interfere with relaxation and sleep, depreciate property values, and cause stress and nervous tension and consequent irritability, insomnia, accident proneness, and increased risk for cardiovascular disease and hypertension." Section 10.60.030 prohibits operating anything that exceeds a noise level of 85 dBA measured 50 feet therefrom. Section 10.60.040 regulates nighttime noise levels, defined as between the hours of 10:00 p.m. to 7:00 a.m. the next morning. The maximum nighttime hourly equivalent sound level (Leq dBA) is 45 and the maximum dBA is 65.

4.10.3 Impact Analysis

a. Methodology and Significance Thresholds.

Methodology. The analysis of noise impacts considers the effects of both temporary construction-related noise, including demolition of the existing residence on the project site and construction activities, and operational noise associated with long-term project-related activities, including project-generated traffic as well as stationary source noise. Construction noise estimates are based upon noise levels reported by the Federal Transit Administration (FTA), Office of Planning and Environment (FTA, 2006), and the distance to nearby sensitive receptors. Reference noise levels from that document were then used to estimate noise levels at nearby sensitive receptors based on a standard noise attenuation rate of 6 dB per doubling of distance, which is the line-of-sight method of sound attenuation for point sources of noise. Construction noise level estimates do not account for the presence of intervening structures or topography, which could reduce noise levels at receptor locations. Therefore, the noise levels presented herein represent a conservative, reasonable worst-case estimate of actual construction noise. The maximum community noise exposure levels shown in Figure 4.10-1 and applicable County General Plan Noise Element policies were used to determine whether noise generated during the project construction or operational phases would result in a significant impact on nearby sensitive receptors.

Significance Thresholds. Pursuant to Appendix G of the *State CEQA Guidelines*, potentially significant impacts would occur if the project would result in any of the following conditions:

1. Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
2. Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels;
3. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;
4. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;
5. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels; and/or

6. For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels.

The project site is not located within any airport noise impact contours and would therefore not expose residents or workers to excessive noise levels from airport or private air strip operations. Further discussion regarding thresholds 5 and 6 can be found in Section 4.14, *Effects Found not to be Significant.*

For traffic-related noise, impacts are considered significant if project-generated traffic would result in exposure of sensitive receptors to an unacceptable increase in noise levels. Recommendations contained in the *Transit Noise and Vibration Impact Assessment* (FTA, 2006) were used to determine whether increases in traffic noise would be unacceptable. With these standards, the allowable noise exposure increase is reduced with increasing ambient existing noise exposure, such that higher ambient noise levels have a lower allowable noise exposure increase. Table 4.10-5 shows the significance thresholds for increases in traffic-related noise levels caused by the project.

Table 4.10-5
Significance of Changes in Operational Roadway Noise Exposure

Existing Noise Exposure (dBA Ldn or Leq)	Allowable Noise Exposure Increase (dBA Ldn or Leq)
45-50	7
50-55	5
55-60	3
60-65	2
65-74	1
75+	0

Source: FTA, 2006.

If sensitive receptors would be exposed to traffic noise increases exceeding the above criteria, impacts would be considered significant. Impacts related to on-site activities, such as noise from construction activity, would be considered significant if project activities would result in noise levels exceeding 60 dB Ldn or CNEL as shown in the County of Monterey community noise exposure levels, as depicted in Figure 4.10-1, or conflict with applicable County General Plan Noise Element policies. Policy S-7.7 requires a noise impact analysis for projects within the 60 CNEL roadway or railroad noise contours.

b. Project Impacts and Mitigation Measures.

Threshold 1:	*Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.*
Threshold 4:	*A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.*

Impact N-1 Noise from demolition of existing structures, excavation and grading, and construction of the project and associated infrastructure has the potential to adversely impact existing and future nearby residences. Impacts would be Class II, *significant but mitigable.*

The main sources of noise during construction activities would include heavy machinery used in demolition, grading, and clearing the site, as well as equipment used during building construction and paving, creating temporary or periodic increases in ambient noise. Table 4.10-6 demonstrates the typical noise levels associated with heavy construction equipment. Based on the type of construction required and the generally flat topography of the site, this list of equipment is appropriate for the proposed project.

As shown in Table 4.10-6, average noise levels associated with the use of heavy equipment at construction sites can reach up to 89 dBA at 50 feet from the source. The heaviest equipment use would occur during construction of the proposed on-site looped road, including placement of sewer and other utilities within the right-of-way. Construction of the individual houses would also be a source of noise, mainly during framing with the use of air compressors and nail guns and no structure in place to reduce sound travel.

Table 4.10-6
Typical Construction Equipment Noise Levels

Equipment	Typical Maximum Noise Level (dBA)			
	50 Feet from the Source	70 Feet from the Source	170 Feet from the Source	200 Feet from the Source
Air Compressor	81	77	67	63
Backhoe	80	76	66	62
Paver	89	85	75	71
Concrete Mixer	85	81	71	67
Dozer	85	81	71	67
Jack Hammer	88	84	74	70
Roller	74	70	60	56
Grader	85	81	71	67
Scraper	89	85	75	71
Truck	88	84	74	70

Source: Table 12-1 in FRA, 2006.
Noise levels based on actual maximum measured noise levels at 50 feet (Lmax).
Noise levels assume a noise attenuation rate of 6 dBA per doubling of distance.

The two nearest existing residences are north and south of the project site, the closest being 50 feet from the project boundary. These receptors could be as close as 50 feet from grading activities, 70 feet from house construction (due to the required 20-foot rear building setback), and 170 to 200 feet from construction of the internal looped roadway. If new residences are constructed and occupied prior to completion of all on-site construction, these future residences would also be located in close proximity to construction activities.

Based on the noise levels shown in Table 4.10-6, site grading within 50 feet of residences could result in noise levels of up to 89 dBA. At a distance of 70 feet, noise levels of 84 dBA for a jack hammer and 77 dBA for an air compressor, which the most typical equipment used for house construction, could occur. The maximum noise exposure level from road construction equipment is estimated at 75 dBA at a distance of 170 feet. Depending on the duration and timing of construction activity, maximum noise levels at nearby receptors may result in an exceedance of the County's 60 dBA CNEL standard for residential receptors. Therefore, the existing residences nearest to the project site and future residences on the project site may experience unacceptable noise levels during project construction, which is estimated to last approximately 18 months.

Monterey County General Plan Safety Element noise Policies S-7.9 and S-7.10 address construction noise impacts by restricting hours of operation and requiring standard noise protection measures:

S-7.9 No construction activities pursuant to a County permit that exceed "acceptable" levels listed in Policy S-7.1 shall be allowed within 500 feet of a noise sensitive land use during the evening hours of Monday through Saturday, or anytime on Sunday or holidays, prior to completion of a noise mitigation study. Noise protection measures, in the event of any identified impact, may include but not be limited to:

- Constructing temporary barriers, or
- Using quieter equipment than normal

S-7.10 Construction projects shall include the following standard noise protection measures:

- Construction shall occur only during times allowed by ordinance/code unless such limits are waived for public convenience;
- All equipment shall have properly operating mufflers; and
- Lay-down yards and semi-stationary equipment such as pumps or generators shall be located as far from noise-sensitive land uses as practical.

Monterey County Code Chapter 10.60.040 sets nighttime noise limits to 45 Leq dBA and a maximum dBA of 65 between the hours of 10:00 p.m. to 7:00 a.m. The County General Plan has tighter restrictions on construction noise, limiting construction on weekdays and Saturdays before sundown and not on Sundays to reduce noise impacts, therefore, the County Code requirements are being addressed through adherence to the County General Plan.

The County has requirements for reducing construction noise, as shown above, but because of the potential noise exposure estimated above, additional mitigation is necessary to reduce those impacts to a less than significant level.

Mitigation Measures. Noise-generating construction activities would be restricted by the 2010 General Plan to weekdays and Saturday before sundown, and not allowed on Sunday. Compliance with these requirements would partially limit construction-related noise impacts. The following measures are also required.

N-1(a) **Construction Equipment.** Construction equipment shall be properly maintained and all internal combustion engine driven machinery with intake and exhaust mufflers and engine shrouds, as applicable, shall be in good condition and appropriate for the equipment. Equipment engine shrouds shall be closed during equipment operation. Whenever feasible, electrical power shall be used to run air compressors and similar power tools rather than diesel equipment. The developer shall require all contractors, as a condition of contract, to maintain and tune-up all construction equipment to minimize noise emissions.

N-1(b) **Vehicle and Equipment Idling.** Construction vehicles and equipment shall not be left idling for longer than five minutes when not in use.

N-1(c) **Stationary Equipment.** Stationary construction equipment that generates noise that exceeds 60 dBA Leq at the boundaries of the nearby residential uses shall be shielded. Temporary noise barriers used during construction activity shall be made of noise-resistant material sufficient to achieve a Sound Transmission Class (STC) rating of STC 40 or greater, based on sound transmission loss data taken according to ASTM Test Method E90. Such a barrier may provide as much as a 10 dB insertion loss, provided it is positioned as close as possible to the noise source or to the receptors. To be effective, the barrier must be long and tall enough (a minimum height of eight feet) to completely block the line-of-sight between the noise source and the receptors. The gaps between adjacent panels must be filled-in to avoid having noise penetrate directly through the barrier. The recommended minimum noise barrier or sound blanket requirements would reduce construction noise levels by at least 10 dB.

The equipment area with appropriate acoustical shielding shall be designated on building and grading plans. Equipment and shielding shall remain in the designated location throughout construction activities.

Prior to issuance of grading permits, the project proponent shall submit building and grading plans that show the appropriate construction equipment noise reduction measures to the RMA – Planning Department. Compliance shall be monitored by County Building Inspectors.

N-1(d) **Workers' Radios**. All noise from workers' radios shall be controlled to a point that they are not audible at sensitive receptors near the construction activity.

N-1(e) **Disturbance Coordinator**. A noise disturbance coordinator shall be designated by the contractor. The noise disturbance coordinator shall be responsible for responding to any local complaints about construction noise. The noise disturbance coordinator shall determine the cause of the noise complaint (e.g., starting too early, bad muffler, etc.) and shall require that reasonable measures warranted to correct the problem be implemented. A telephone number for the disturbance coordinator shall be conspicuously posted at the construction site.

Significance After Mitigation. Implementation of Mitigation Measures N-1(a) through N-1(e) would reduce construction noise impacts to a less than significant level.

Threshold 2:	*Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels.*

Impact N-2 **Construction-related activities associated with the proposed project would intermittently generate groundborne vibration on and adjacent to the site. This may affect existing off-site receptors near the project site and proposed on-site residences, but would not create vibrations that could cause structural damage to adjacent structures within 100 feet of the project site. Impacts would be Class III, *less than significant*.**

As discussed under Impact N-1, the construction phase of the project would be temporary, estimated to last approximately 18 months. Project construction would not involve pile driving, blasting, or similar types of construction to create vibrations could cause structural damage to buildings. Project excavation and filling, the main heavy construction activities with this project, do not typically result in substantial vibration impacts. Monterey County General Plan Policy S-7.8 requires all discretionary projects that have the potential to create vibrations that could cause structural damage to submit a pre-construction vibration study prior to approval of a building permit. Any changes to project construction that could result in such vibrations would be subject to Policy S-7.8 and would be administered during the building permit stage, a non-discretionary action.

The primary vibratory source during construction would likely be large bulldozers and loaded trucks. Table 4.10-7 identifies various vibration velocity levels for the types of construction equipment that would operate at the project site during construction. As shown, a typical bulldozer or loaded truck generates an approximate vibration level of 77-78 VdB at a distance of 50 feet.

Table 4.10-7
Vibration Levels
for Construction Equipment

Equipment	Approximate Vibration Decibels (VdB)
	50 feet from construction
Hoe Ram	78
Large Bulldozer	78
Loaded Trucks	77
Jackhammer	70
Small Bulldozer	48

Source: FTA, 2006.

Nearby sensitive receptors are located approximately 50 feet from the use of such equipment, therefore the highest vibration velocity from the project would be 78 VdB. At this velocity, vibration levels would not exceed the FTA recommended 80 VdB threshold for infrequent events at residences and buildings where people normally sleep (Table 4.10-2). Vibration also would not exceed 95 VdB, the vibration level which would damage extremely fragile historic buildings. In addition, in compliance with County General Plan Policy S-7.9, construction equipment would only operate during daytime hours, and thus would not generate vibration during the nighttime, when people are typically sleeping. Impacts would be less than significant.

Mitigation Measures. No mitigation is required.

Significance After Mitigation. Impacts would be less than significant without mitigation.

Threshold 3: *A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.*

Impact N-3 **Occupants of proposed on-site and existing off-site residential units would not experience noise level increases exceeding applicable thresholds as a result of project-generated traffic on Highway 1, Carmel Valley Road, Val Verde Drive, Rio Road, or Carmel Rancho Boulevard. Project-generated traffic would have a less than significant impact on exterior and interior noise levels at existing and proposed sensitive receptors on Val Verde Drive. Impacts would be Class III, *less than significant*.**

Implementation of the proposed project would result in an increase in the average number of daily vehicle trips along the segments of Highway 1, Carmel Valley Road, Rio Road, Carmel Rancho Boulevard, and Val Verde Drive. The projected total number of net daily trips generated from the project would be 285, as shown in the Val Verde Subdivision Traffic Impact Analysis (Hatch Mott MacDonald, June 2016). The maximum trip count at any individual

intersection is 30 trips, which would occur at the Carmel Rancho Boulevard/Rio Road intersection during the PM Peak Hour. This represents a 3% increase in traffic at that intersection, which currently experiences 1,012 trips in the PM peak hour. In general, a doubling of traffic is required to produce a traffic noise level increase of approximately 3 dBA. Therefore, the relatively small increase in traffic associated with the project would not be expected to result in a noticeable increase in area traffic noise along any roadway. As shown in Table 4.10-2, ambient noise levels at the project location are below 50 dBA Leq. According to the significance thresholds for increases in traffic-related noise provided in Table 4.10-5, an increase in traffic noise that does not exceed 7 dBA would be less than significant. Based on the traffic volumes projected for this project, there would be no discernable change in traffic noise resulting from the project, and traffic noise impacts would be less than significant.

Similarly, this level of increase would not result in a change to the General Plan noise contours. The project is currently well outside the 60 CNEL County noise contours for all the major roadways modeled nearest to the project site, and would remain outside those noise contours because project-generated traffic would have no effect on those noise contours. This is consistent with General Plan Policy A-7.7, which requires a project-specific noise impact analysis only for projects within a 60 CNEL noise contour or greater, as well as the County's Community Noise Exposure level of 60 CNEL as a Normally Acceptable noise level for residential uses. Therefore, impacts to proposed on-site and existing off-site residential units would be less than significant.

Mitigation Measures. No mitigation is required.

Significance After Mitigation. Impacts would be less than significant without mitigation.

Threshold 3:	*A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.*

Impact N-4 **The proposed residential uses would be subject to operational noise generated from existing commercial operations west of the site, as well as noise generated from outdoor activities and operations on nearby school playgrounds. However, noise generated by these uses would not exceed applicable standards. The project would also generate additional noise from operation of the proposed residential uses. These noise impacts would not cause the applicable standards to be exceeded for any nearby uses. Impacts would be Class II, *less than significant*.**

The proposed project would be located adjacent to professional commercial uses to the west, residences to the north and south, and undeveloped land to the east that is currently in agricultural production. In addition, Carmel Middle School is located approximately 500 feet east of the northeastern corner of the site. Noise generated from agricultural equipment and/or playground noise related to the school would be periodic, and would therefore not be expected to significantly affect the proposed land uses.

The proposed project would result in development of the site with single-family residences, which are not land uses that would create a substantial permanent increase in ambient noise levels in the area and would be governed by the Monterey County Code Chapter 10.60.030 and 040 not allowing the operation of anything producing noise above 85 dBA at a distance of 50 feet, and not allowing noise above 45Leq dBA or a maximum dBA of 65 between the hours of 10:00 p.m. to 7:00 a.m. The proposed project would generate non-mobile operational noise that would be typical of residential uses, including periodic instantaneous sounds such as conversations, music, general vehicular movement, and doors slamming. These noises produced by the project would be similar to the existing noise environment associated with existing surrounding uses. The noise associated with operation of the proposed residential uses would not substantially impact the existing sensitive receptors in the vicinity of the project. Therefore, noise associated with operation of the proposed residential uses would not substantially impact the existing sensitive receptors near the site.

Mitigation Measures. No mitigation is required.

Significance After Mitigation. Impacts would be less than significant without mitigation.

c. Cumulative Impacts. The geographic extent for the analysis of cumulative stationary noise impacts is generally limited to areas within 0.5 mile of the proposed project. This geographic extent is appropriate for the issue of noise because the project's noise impacts are fairly localized and site-specific. Beyond this distance, impulse noise may be briefly audible and steady construction from the proposed project would generally dissipate such that the level of noise would reduce to below the County's maximum noise standards and/or blend in with the background noise level. Development of past, present and reasonably foreseeable future developments within 0.5 mile of the site could cumulatively increase the potential for exposure of people to increased noise levels associated with construction and operation of the project. The project would contribute to these cumulative effects. As stated in Section 3.8 (Cumulative Projects Setting) in Section 3.0, *Environmental Setting*, this EIR examines cumulative impacts based on a list of projections provided by the County of Monterey, which would result in an increase of approximately 562 housing units, 15,500 square feet of commercial space, and 16 hotel rooms. This cumulative development has the potential to have a substantially adverse effect on noise, increasing noise on local and regional roads. Cumulative impacts to noise as a result of this transition to a more urbanized character would be significant. Given that the proposed project would result in less than significant noise impacts, or mitigated to that level, within this geographic extent, the project's contribution to this cumulative impact would be less than significant.

The geographic extent for the analysis of cumulative transportation noise impacts related to noise is limited to the study area described in Section 4.14, *Transportation and Circulation*. This area is defined as the geographic extent of the cumulative noise impact area because project-generated traffic would be limited to this area. Project-generated traffic is minimal in this area and would disperse to a large number of roadways. As such, it would not create noise above any standards. Given that the proposed project would result in less than significant traffic-related noise impacts within this geographic extent, the project's contribution to this cumulative impact would be less than significant.

This page intentionally left blank.

4.11 POPULATION AND HOUSING

4.11.1 Summary

Table 4.11-1 summarizes the identified environmental impacts, proposed mitigation measures, and residual impacts of the proposed project with regard to population and housing. Additional detail is provided in Section 4.11.3 (Impact Analysis).

Table 4.11-1
Impact and Mitigation Summary: Population and Housing

Impact	Mitigation Measures	Residual Impact
Impact PH-1 Implementation of the proposed project would induce population and housing growth in the immediate area. The increases are within the AMBAG and Monterey County General Plan projections; therefore, impacts related to population growth would be Class III, less than significant.	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact PH-2 The proposed project would increase the housing stock. Impacts related to the displacement of housing and people would be Class III, less than significant.	No mitigation is required.	Impacts would be less than significant without mitigation.

4.11.2 Setting

a. County of Monterey. The project site is located in northwestern unincorporated Monterey County in the westernmost portion of the Carmel Valley planning area known as the Mouth of the Valley.

Population. Table 4.11-2 provides the most recent estimates of population and housing for Monterey County and the area surrounding the project site. As shown therein, the population of Monterey County is 437,178, the population of the City of Carmel-by-the-Sea is 3,833, and the unincorporated area surrounding the City of Carmel-by-the-Sea, which includes the project area, has an estimated population of 11,368. The total population of the Carmel-by-the-Sea County Census Division accounts for 3.5% of Monterey County's population.

Table 4.11-2
Current Population

	City of Carmel-by-the-Sea	Remainder of Carmel-by-the-Sea Census County Division	Unincorporated County	County
Population	3,833	11,542	105,545	437,178

Source: California Department of Finance, 2016; U.S. Census Bureau, 2013.

The County's population increased from 247,450 persons in 1970 to 415,057 persons in 2010. The decade with the largest percentage population growth was 1980-90, when the population increased by 22% (County of Monterey, 2016).

Employment Characteristics. The farming and hospitality industries represent two major economic sectors in Monterey County, particularly in the unincorporated areas. In general, people employed in these industries tend to earn lower incomes, with most minimum-wage jobs being concentrated in these two sectors. The County's reliance on these two sectors for employment generates a substantial demand for affordable housing. Paradoxically, the natural beauty of the California coastlines that made Monterey County a vacation destination have also made the County one of the most desirable areas to live in, resulting in elevated real estate prices, and complicating the County's market conditions and their ability to provide affordable housing for working households (County of Monterey, 2016).

Household Income. According to the 2003-2013 American Community Survey (ACS), the median household income for Monterey County was $59,168 annually. In contrast, the median household income for the unincorporated area surrounding the City of Carmel-by-the-Sea was $109,542 for the same time period, as shown in Table 4.11-3.

Table 4.11-3
Median Household Income in 2013

	City of Carmel-by-the-Sea	Remainder of Carmel-by-the-Sea Census County Division	Unincorporated County	County
Median Income	$71,719	$109,542	n/a	$59,168

U.S. Census Bureau, 2013.
n/a: data not available

The State Department of Housing and Community Development (HCD) has established five income groups to be used in General Plan Housing Elements based on Area Median Income (AMI):

- Extremely Low Income: up to 30% of AMI
- Very Low Income: 31-50% of AMI
- Low Income: 51-80% of AMI
- Moderate Income: 81- 120% AMI
- Above Moderate Income: >120%

AMI categories of extremely low, very low, and low income households are collectively referred to as lower income households. According to income data provided by the U.S Housing and Urban Development Department (HUD), approximately 27% of households in unincorporated Monterey County were lower income households. Renter-households (47%) in unincorporated Monterey County were more likely than owner-households (18%) to be lower-income (County of Monterey, 2016).

Housing. For purposes of evaluating housing supply and demand, it is helpful to translate information from population figures into household data. The U.S. Bureau of the Census defines a household as all persons who occupy a housing unit, which may include single persons living alone, families related through marriage or blood, and unrelated individuals living together. Persons living in retirement or convalescent homes, dormitories, or other group living situations are not considered households. As shown in Table 4.11-4, there are

an estimated 139,435 households in Monterey County. Just over one quarter of these, or 38,874 households, reside in unincorporated areas of the County (California Department of Finance, 2016).

Table 4.11-4
Household Characteristics

	City of Carmel-by-the-Sea	Remainder of Carmel-by-the-Sea Census County Division	Unincorporated County	County
Housing Units	3,421	6,215	38,874	139,435
Persons/Household	1.81	2.22	3.03	3.30

Source: California Department of Finance, 2016; U.S. Census Bureau, 2013.

Household size is an indicator of changes in population or use of housing. An increase in household size can indicate an increase in the number of large families or a trend toward overcrowding of housing units. A decrease in household size, on the other hand, may reflect an increase in the number of elderly or single-person households or a decrease in family size. In 2000, the average household size in Monterey County was reported at 3.14, which remained stable through 2010. The 2016 housing estimates shows an increase in household size to 3.30. Comparatively, in 2000 the average household size in the City of Carmel-by-the-Sea was 1.79 and the 2016 housing estimates show a slight increase to 1.81 (California Department of Finance, 2012 and 2016).

The characteristics of the housing stock are important in determining the housing needs for the community. The housing stock in the unincorporated areas of Monterey County is comprised primarily of single-family housing. The agricultural/rural areas of the County typically have single family homes on large parcels of land. Table 4.11-5 shows population and housing projections for the year 2030 for Monterey County.

Table 4.11-5
Projected Housing and Population

	Existing County (2016)	AMBAG Projections for County (2035)	Existing Unincorporated County (2016)	AMBAG Projections for Unincorporated County (2035)
Housing Units	139,435	157,992	38,874	39,735
Population	437,178	495,086	105,545	104,304

Source: AMBAG, 2014b.

Regional Housing Needs Allocation (RHNA). The RHNA provides an estimate of the number and type of housing units that should be provided in the community to meet its share of new households in the region. The Association of Monterey Bay Area Governments (AMBAG) has assigned Monterey County a RHNA of 1,551 units for the 2014-2023 planning period. Table 4.11-6 includes the RHNA allocation. □

The County must ensure the availability of residential sites through land use regulations at adequate densities and appropriate development standards to accommodate these units by income category. As of January 2014, the County has approved or constructed 226 very low income and 190 low income units towards the RHNA allocation. Table 4.11-6 shows the County's progress towards the RHNA allocation.

Table 4.11-6
RHNA Allocation and Progress for Unincorporated Monterey County

Income Category	RHNA	Units Constructed Since January 1, 2014 or Approved/Entitled Units	Remaining RHNA
Very Low	374	226	148
Low	244	190	54
Moderate	282	276	6
Above Moderate	641	2,448	(1,797)
Total Units	1,551	3,140	208

Source: County of Monterey, 2016

b. Project Area. The project site is bordered to the north by rural density single-family residences. The Cottages of Carmel retirement community and Carmel Rancho Shopping Center are approximately 500 feet to the north bordered by Carmel Valley Road. A new affordable housing development was recently submitted to Monterey County for undeveloped land north and east of the site. The land north of Carmel Valley Road is built with rural density single-family residences at a density of one to five units per acre.

Val Verde Drive runs along the eastern boundary of the site. Across Val Verde Drive is undeveloped land, which was previously approved for development of the Carmel Community Life Center; however, entitlements for this project have expired. Beyond the undeveloped land across Val Verde Drive is the Rancho Canada Golf Club, located approximately 500 feet east of the southeast corner of the site. Carmel Middle School is located approximately 500 feet east of the northeastern corner of the site.

South of the project there are a few rural density single-family residential properties, then Rio Road. On the south side of Rio Road there are several high density residential complexes. Beyond the high density development is the Carmel River, which is approximately 1,050 feet south of the project site.

Commercial properties are present on the west side of the project site bordered by Carmel Rancho Boulevard.

c. Regulatory Setting

Monterey County General Plan. Population and housing related policies are contained within the Monterey County General Plan Land Use and Housing Element. Land Use Element

Policy LU-2.12 requires that the County establish a program for retaining affordable housing units, while Policy LU-2.13 requires that 25% of new housing units be affordable to very low, low, moderate, and workforce income households.

State law identifies the subjects that must be addressed in a Housing Element. These guidelines are identified in Article 10.6 of the State of California Government Code (Sections 65580 et seq.) The Housing Element assesses housing needs, evaluates the current housing market in the county, and identifies programs that will meet housing needs. The housing market evaluation includes a review of housing stock characteristics as well as housing cost, household incomes, special need households, availability of land and infrastructure and various other factors.

Regional Housing Needs Allocation (RHNA). The RHNA provides an estimate of the number and type of housing units that should be provided in the community to meet its share of new households in the region. The County must ensure the availability of residential sites at adequate densities and appropriate development standards to accommodate these units by income category. In addition to this information, the Housing Element document must evaluate and review its past housing programs and consider this review in planning future *housing strategies.*

Monterey County Code, Chapter 18.40, Inclusionary Housing Ordinance. The County's Inclusionary Housing Ordinance requires that that 20% of units or lots in new residential developments be affordable to very low, low and moderate income households. The ordinance applies to developments of three or more units or lots and exempts farm worker housing and mobile home parks. Requirement can be met through on-site provision, off-site provision, or payment of an in-lieu fee. It should be noted that this requirement is slightly different than General Plan Policy LU-2.13, which requires 25% affordable and workforce units.

Carmel Valley Master Plan. CVMP policies both refine General Plan policies and provide unique policies specific to the Carmel Valley geographic area. The project is subject the CVMP supplemental policies, in particular Policy CV-1.10, which prescribes allowable densities for projects within the Val Verde area, as follows:

> *Policy CV-1.10: The Val Verde Drive area is planned for residential use at a basic density of one (1) unit per acre. With suitable clustering, up to two (2) units per acre may be allowed. However, a density of up to four (4) units per acre may be allowed provided that at least 25% of the units are developed for individuals of low and moderate income or for workforce housing. This policy is intended to be independent from Policy CV-1.11, and not counted in conjunction with the density bonus identified in that policy.*

AMBAG Regional Housing Needs Allocation Plan 2007-2014. This Plan was developed in accordance with the requirements of the State of California (Government Code Section 65584). The Plan provides a draft allocation of the regional housing needs for each jurisdiction in Monterey and Santa Cruz counties, including all of the incorporated cities as well as unincorporated county areas. These allocations are used by each jurisdiction in the update of their Housing Element. State law further requires that the distribution of the regional housing needs allocations seeks to "[allocate] a lower proportion of housing need to an income category

when a jurisdiction already has a disproportionately high share of households in that income category" (California Code Section 65584(d)(4)).

4.11.3 Impact Analysis

a. Methodology and Significance Thresholds. Impacts related to population are generally social or economic in nature. Under CEQA, a social or economic change generally is not considered a significant effect on the environment unless the changes can be directly linked to a physical change. Pursuant to the State *CEQA Guidelines* Appendix G Environmental Checklist, impacts related to population and housing would be potentially significant if the project would:

1. *Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure);*
2. *Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere; and/or*
3. *Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere.*

b. Project Impacts and Mitigation Measures.

Threshold 1:	*Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure).*

Impact PH-1 Implementation of the proposed project would induce population and housing growth in the immediate area. The increases are within the AMBAG and Monterey County General Plan projections; therefore, impacts related to population growth would be Class III, *less than significant.*

Full implementation of the proposed project would develop 24 of the new lots with one market rate single-family unit each. The remaining lot would be developed with seven inclusionary units, for a total of 31 units. Based on the average persons per household shown in Table 4.11-4, the proposed addition of 31 residential units would generate an increase of approximately 56 to 102 residents. This would be a less than 1% population increase to the Carmel-by-the-Sea Census County Division and/or the unincorporated area of the Monterey County. This growth is within AMBAG and Monterey County General Plan growth projections. The CVMP Policy CV-1.6 limits new residential subdivisions in Carmel Valley to 190 units. Since adoption of this policy, five units have been constructed and 24 units are reserved, leaving a potential buildout of 161 additional units. The project itself would fit within the identified unit cap, and would therefore be consistent with this policy.

Indirect impacts are not expected as a result of the project. No widening or extension of county roads is included in the project. The internal looped road that would be constructed on the site would only have access onto Val Verde Drive. Other infrastructure included in the project, including water, sewer, and electrical, would not induce other growth because three sides of the

project are already developed and the vacant property to the east could gain access to the same infrastructure with or without this project.

Therefore, the project would not induce substantial population growth and direct and indirect impacts would be less than significant.

Mitigation Measures. No mitigation is required.

Significance After Mitigation. Impacts would be less than significant.

Threshold 2:	*Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere.*
Threshold 3:	*Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere.*

Impact PH-2 The proposed project would increase the housing stock. Impacts related to the displacement of housing and people would be Class III, *less than significant*.

The proposed project would remove one existing residential unit, potentially displacing two to three people. However, 31 residential units would be developed in its place, creating a net increase to the County's market rate and affordable housing stock. Seven of these units, or approximately 22.6%, would be inclusionary units and the developer would be responsible for paying an additional in-lieu fee of $206,544 to reach the 25% inclusionary requirement, as detailed in CVMP Policy CV-1.10. See Section 4.9, *Land Use,* for additional discussion about the project's consistency with this policy.

Because the project would construct more housing than it would remove, including seven inclusionary affordable units, impacts related to the displacement of housing and population would be less than significant.

Mitigation Measures. No mitigation is required.

Significance After Mitigation. Impacts would be less than significant.

c. Cumulative Impacts. The geographic scope for cumulative impacts to population and housing is the Carmel Valley. As shown in Table 3-1 in Section 3.0, *Environmental Setting*, past, present, and reasonably foreseeable future projects in Carmel Valley would add an estimated 524 dwelling units to the Valley, including 142 units of inclusionary or workforce housing.

Housing and Population Growth. CVMP Policy CV-1.6 limits new residential subdivisions in Carmel Valley to 190 units. As noted above and shown in Table 3-1 in Section 3.0, *Environmental Setting*, an additional 524 units, exclusive of the project, are proposed by other developments near the project site. If all these units are constructed, cumulative buildout would exceed the new units allowed by Policy CV-1.6. The proposed project would contribute to this cumulative policy inconsistency. However, in accordance with CVMP policy, the Board of Supervisors would not approve the creation of new units beyond the 190-unit cap. Thus, not all

development shown in Table 3-1 would be constructed without Board approval of an amendment to the CVMP.

The proposed project's contribution to the 190-unit cap would be 31 units, or 16.3%. The addition of 190 units in Carmel Valley would generate a population increase of approximately 344 to 627 residents, based on the average persons per household shown in Table 4.11-4. The proposed project's contribution to this cumulative population growth – 56 to 102 residents – would again be just 16.3% of growth allowed in Carmel Valley. Therefore, the project's contribution to cumulative housing and population growth in Carmel Valley would be less than significant.

Displacement of Housing and Population. The project would displace one residential unit and two to three people. Cumulative development projects throughout the Carmel Valley could similarly displace residences and populations. However, as with the proposed project, the cumulative development would add to the local housing stock. Approximately 54% of the units shown in Table 3-1 would be inclusionary housing. Because cumulative development would construct more housing than it would remove, cumulative impacts related to the displacement of existing housing units or people would not be cumulatively considerable, and the project's contribution to this impact would be less than significant.

4.12 PUBLIC SERVICES

4.12.1 Summary

Table 4.12-1 summarizes the identified environmental impacts, proposed mitigation measures, and residual impacts of the proposed project with regard to public services. Additional detail is provided in Section 4.12.3 (Impact Analysis).

Table 4.12-1
Impact and Mitigation Summary: Public Services

Impact	Mitigation Measures	Residual Impact
Impact PS-1 The proposed project would place increased demands on fire protection services, but would not create the need for new or expanded fire protection facilities. Impacts would be Class III, less than significant.	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact PS-2 The proposed project would generate new residents that would require police protection services. This increase in service population would not increase response times beyond acceptable levels and would not require additional police staff or vehicles such that new or expanded police facilities would need to be constructed. Therefore, impacts would be Class III, *less than significant.*	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact PS-3 The proposed project would generate an estimated five elementary, middle, and high school students. Students generated by the project would attend Carmel River Elementary School, Carmel Middle School, and Carmel High School, none of which would be required to operate above capacity as a result of the project. Therefore, implementation of the proposed project would not require construction of new or physically altered educational facilities. Impacts to schools would be Class III, *less than significant*.	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact PS-4 The proposed project would generate new residences that may utilize the Harrison Memorial Library and/or the Carmel Valley Branch Library. However, this increase in population would not trigger the need to construct new library facilities or altered library facilities. Therefore, Impacts would be Class III, less than significant.	No mitigation is required.	Impacts would be less than significant without mitigation.

4.12.2 Setting

a. Fire Protection/Emergency Medical Services. The California Department of Forestry and Fire Protection (CAL FIRE) Cypress Fire Protection District (CFPD) provides fire protection and medical emergency services to the project site and surrounding area. The CFPD provides service related to fire control and suppression, rescue, advanced life support/emergency medical assistance, and the mitigation of hazardous materials incidents. In the event of major disasters, the CFPD is trained and equipped to handle a countywide incident, including earthquakes, tsunami, fires, hazardous material incidents, and other major emergencies.

The CFPD has two fire stations; the Rio Road Fire Station and the Carmel Hill Fire Station. The nearest fire station to the project site is the Rio Road Fire Station, located approximately 1,000 feet west of the project site, at 3775 Rio Road. The Rio Road Fire Station is fully staffed year-round with a captain, engineer, and paramedic 24 hours a day (Veyna, 2015). The station is equipped with a paramedic fire engine and able to provide Advanced Life Support (ALS) non-transport paramedic services.

The district's average response time in the jurisdiction is five minutes, while the response time to the project site are between two to three minutes (Veyna, 2015).

b. Police Protection Services. The Monterey County Sheriff's Office is responsible for providing police protection services to the project site. The nearest station is the Coastal Station, which is a Sheriff's Office Substation and is located at 1200 Aguajito Road in the City of Monterey, approximately 3.5 miles northeast of the project site. The project area is located in the Beat 7 Area. The north and south boundaries of Beat 7 include both sides of Highway 1 from Carmel High School to Rocky Point. The east and west boundaries include both sides of Carmel Valley Road from Highway 1 to Rancho San Carlos Road. During the day shift (7 a.m. to 5 p.m.), there is one deputy in a patrol vehicle on patrol in Beat 7. During the swing shift (3 p.m. to 1 a.m.) and the midnight shift, (9 p.m. to 7 a.m.), no Coastal Station Deputies are assigned to Beat 7. There are two deputies, each in a patrol vehicle, assigned from the swing shift at the Central Station in Salinas. The deputies travel to the Monterey Peninsula to cover all the Coastal Station Beat areas. This information is current as of August 1, 2016 and staffing levels have been in effect since October 3, 2015 (Galetti, 2016).

The department's average response time depends on several factors. One factor is where the deputy is in the beat area in relation to the location of the incident when the call for service is released. Another factor is the priority level. For example, a higher priority call, such as a Code 3 Call, which requires lights and sirens, will have a faster response time then a Code 1, which is a proceed as normal call. During the time frame of January through December 2013, the average response time was nine minutes, seven seconds, which includes both emergency and non-emergency calls. However, due to a recent reduction in staffing levels, this response time is assumed to be higher (Galetti, 2016).

The California Highway Patrol provides traffic enforcement and accident investigation for Carmel Valley. The Sheriff's Department may also aid in traffic enforcement, however their primary function is to respond to criminal violations (County of Monterey, 2016).

c. Schools. The project site is within the Carmel Unified School District (CUSD) boundaries. The CUSD operates nine schools: Carmel Child Development Center, Cachagua Center, Tularcitos Elementary, Carmel River Elementary, Captain Cooper Elementary, Carmel Middle School, Carmel High School, Carmel Valley High School, and Carmel Adult School. The following schools are expected to serve the project (County of Monterey, 2008):

- Carmel River Elementary School
- Carmel Middle School
- Carmel High School

According to enrollment data form the Education Data Partnership (2015), the CUSD experienced a 10% increase in enrollment between 2010 and 2015. Enrollment for the 2014/2015 school year totaled 2,492 students.

d. Libraries. The Harrison Memorial Library is located at the corner of Ocean Avenue and Lincoln Street in the City of Carmel-by-the-Sea, approximately 1.5 miles northwest of the project site. The Harrison Memorial Library is funded by the City of Carmel-by-the-Sea and the Carmel Public Library Foundation (CPLF). Charitable contributions fund 100% of the library's books, materials, programs, equipment, and services. The Harrison Memorial Library serves 106,000 locals and visitors from the community (Carmel Public Library Foundation, 2016). The Carmel Valley Branch Library is located approximately 10 miles east of the project site. The library is one of 17 Monterey County Free Libraries (Monterey County Free Libraries, 2016).

e. Regulatory Setting.

State.

State Fire Code and Uniform Building Code. Fire hazards are addressed mainly through the application of the State Fire Code and the Uniform Building Code (UBC). The Fire Code addresses access, including roads, and vegetation removal in high fire hazard areas. The UBC requires development in high fire hazard areas to show proof of nearby water sources and adequate fire flows.

California Penal Code. All law enforcement agencies within California are organized and operate in accordance with the applicable provisions of the California Penal Code. This code sets forth the authority, rules of conduct, and training for police officers. Under State law, all sworn municipal and county officers are state police officers.

School Facilities Act of 1998. The School Facilities Act of 1998, also known as SB 50, provides state funding for new school construction projects that can satisfy specific criteria, including eligibility due to growth, Division of State Architect plan approval, and California Department of Education site approval. However, the act also limits the maximum amount of impact fees that can be charged by school districts as mitigation for new residential, commercial, and industrial construction. Further, if the maximum amount is insufficient to meet their established policies, cities and counties are prohibited from imposing additional conditions to bring the development application into conformity with the established policies. The act also prohibits local agencies from denying a development application on the basis of a person's refusal to provide school facilities mitigation that exceeds the fee amount and refusing to approve any legislative or adjudicative act on the basis that school facilities are inadequate.

Local.

County of Monterey General Plan. The 2010 County of Monterey General Plan provides policies pertaining to:

- Fire Protection, Police Services, and Emergency Medical Services
- Schools
- Hospitals
- Library Services

General Plan policies pertaining to fire protection, police services, and emergency medical services require that emergency roadway connections may be developed where distance to through streets is new residential projects provide more than one access route for emergency response and evacuation unless exempted by the Fire jurisdiction. In addition, pursuant to the General Plan, fire protection requirements must be consistent with adopted fire safety standards.

With regard to schools, the General Plan encourages the use of school facilities during off-school hours for community meetings and recreation. It also establishes that new development must assist in land acquisition and financial support for school facilities, as required by state law. Therefore, prior to the issuance of building permits, the developer must show written confirmation from the school district that applicable fees and contributions have been paid. The County shall, as a condition of approval of development projects, require the project applicant to pay the fees required by statute (Government Code section 65996), as it may be periodically amended) to mitigate the impact of the proposed development on school facilities.

The General Plan further encourages delivery of library services to all areas and residents of the County and promotes expanded access to library facilities and services as needed, including to the aged and disabled, and to persons distant from population centers.

Carmel Valley Master Plan. The project site is within the Carmel Valley Master Plan (CVMP) and is subject to CVMP policies. The CVMP has seven policies relating to Public Services which discuss mainly discuss water management but also that existing school facilities should be utilized as recreational areas.

Monterey County Public Safety and Security Guidelines. The Monterey County Sheriff's Office requires each project applicant to satisfactorily comply with the Monterey County Public Safety and Security Guidelines, as well as with specific guidelines tailored to the project for both private and commercial development.

4.12.3 Impact Analysis

a. Methodology and Significance Thresholds. According to Appendix G of the *State CEQA Guidelines*, impacts related to public services from the proposed project would be significant if the project would:

1. Result in a substantial adverse physical impacts associated with the provision of new or physically altered government facilities, the construction of which could cause

significant environmental impacts, in order to maintain acceptable service ratios, response times, or other objectives for:

i. Fire protection
ii. Police protection
iii. Schools
iv. Parks
v. Other public facilities

Available information pertaining to public services was reviewed during this analysis including, but not limited to, the Monterey County General Plan (County of Monterey, 2010) and the CVMP (County of Monterey, 2013). Fire and police service providers were contacted to ascertain the current average response times and estimated response times to the project site. Impacts to these public services would be considered significant if acceptable response times could not be met, such that the construction of new or expanded facilities would be required to ensure adequate response to the proposed project, and those facilities would result in significant environmental impacts. The evaluation of school impacts is limited to those effects with the potential to result in the need for construction of new classrooms or placement of portable classrooms. Similarly, the evaluation of impacts related to library facilities focus on the potential need for the construction or expansion of r library facilities which might have an adverse physical effect on the environment.

Impacts related to parks and recreation are discussed in Section 4.13, *Recreation*. Therefore threshold 1.iv is not discussed further in this section.

b. Project Impacts and Mitigation Measures

Threshold 1.i:	*Result in substantial adverse physical impacts associated with the provision of new or physically altered government and public service facilities, need for new or physically altered government facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable services ratios, response times or other performance objectives for fire protection.*

Impact PS-1 The proposed project would place increased demands on fire protection services, but would not create the need for new or expanded fire protection facilities. Impacts would be Class III, *less than significant*.

Monterey County contracts CFPD for fire protection services in unincorporated areas, including the project site. As described in Section 4.12.1(b) (Fire Protection/Emergency Medical Services), the CFPD maintains an average response time of five minute to incidents within their service area. According to Table PS-1 of County General Plan Public Services Element, Monterey County requires a 45 minute response time to the project site. According to the CFPD, response times to project site would be within two to three minutes (Veyna, 2015).

The proposed project would include the construction of 31 residential units. Based on the average persons per household for the project area and Monterey County of 2.22 to 3.30 persons

per household, the proposed addition of 31 residential units would generate an increase of approximately 69 to 102 residents.

As discussed previously, the nearest existing fire station is approximately 1,000 feet west of the site, on Rio Road. Due to the relatively small population generated by the project, the distance to the nearest station, and the estimated response times to the site, the proposed project would not trigger the need to construct a new fire station or to expand existing fire stations in order to maintain acceptable response times, performance standards, or levels of service (Veyna, 2015).

According to the CFPD, there would be no accessibility issues to the project site (*ibid*). The applicant proposes to widen Val Verde Drive to 34 feet from Rio Road to the northern property boundary, which would meet the standard Monterey County Condition of Approval (COA) requiring a minimum of two nine-foot travel lanes. The project would also be required to include automatic fire sprinkler systems and household fire warning systems, pursuant to standard COAs. Compliance with these fire conditions would further reduce impacts to fire protection services. Impacts would be less than significant.

Mitigation Measures. No mitigation measures are required.

Significance After Mitigation. Impacts would be less than significant without mitigation.

Threshold 1.ii:	*Result in substantial adverse physical impacts associated with the provision of new or physically altered government and public service facilities, need for new or physically altered government facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable services ratios, response times or other performance objectives for police protection.*

Impact PS-2 The proposed project would generate new residents that would require police protection services. This increase in service population would not increase response times beyond acceptable levels and would not require additional police staff or vehicles such that new or expanded police facilities would need to be constructed. Therefore, impacts would be Class III, *less than significant.*

The proposed project would include the construction of 31 residential units. Based on the average persons per household for the project area and Monterey County (2.22 to 3.30 persons per household), the proposed addition of 31 residential units would generate an increase of approximately 69 to 102 residents.

The Monterey County Sheriff's Office requires each project applicant to satisfactorily comply with the Monterey County Public Safety and Security Guidelines, as well as with specific guidelines tailored to the project for both private and commercial development. Compliance with these guidelines would improve public safety and security of the proposed project.

While California law enforcement does not have standardized service ratios, a decrease in the Department's existing service ratio or an increase in response time that would result in a need to construct new facilities in order to maintain the existing service levels would result in a significant impact related to police services. The Monterey County Sheriff's Office strives to maintain a service standard of one deputy per 1,000 persons. The 2013/2014 ratio of deputies per residents was 1:1,320 (County of Monterey, 2016). This coupled with the increasing population of the area may lead to delayed response times for service calls (County of Monterey, 2016). The County Sheriff's Department already provides police protection services to the existing on-site residence and to the rural density single-family residences that border the site to the north and south.

The increase in population could increase calls for service as well as crime and incident reports taken in the project area. However, this increase would not warrant a new facility or additional staffing (Galetti, 2016). Therefore, the proposed project would not cause significant environmental impacts related to construction of new or expanded police protection facilities and this is a less than significant impact.

As a condition of approval, the project applicant would also be required to pay the applicable development impact fee pursuant to the County's applicable fee schedule. These fees would be required to be paid at the time building permits are issued.

Mitigation Measures. No mitigation measures are required.

Significance After Mitigation. Impacts would be less than significant without mitigation.

Threshold 1.iii:	*Result in substantial adverse physical impacts associated with the provision of new or physically altered government and public service facilities, need for new or physically altered government facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable services ratios, response times or other performance objectives for schools.*

Impact PS-3 The proposed project would generate an estimated five elementary, middle, and high school students. Students generated by the project would attend Carmel River Elementary School, Carmel Middle School, and Carmel High School, none of which would be required to operate above capacity as a result of the project. Therefore, implementation of the proposed project would not require construction of new or physically altered educational facilities. Impacts to schools would be Class III, *less than significant*.

As described above, the proposed project would be located in CUSD jurisdiction and be served by Carmel River Elementary School, Carmel Middle School, and Carmel High School. The proposed project could potentially increase student enrollments within the CUSD. A conservative multiplying factor of 0.18 students per household was used to determine the potential increase of school-age children attending public schools (County of Monterey, 2016). Based on the proposed net increase of 30 units, approximately five school-aged children would

be generated from the project. The introduction of new students would result in placing further demands upon school services.

Although CUSD has been experiencing an increase in enrollment, the addition of five students to the district would represent a less than 1% increase in total enrollment and no new schools or expanded facilities would need to be constructed to accommodate students generated by the proposed project. Also, as stated above in the regulatory setting, the project developer would be required to pay school impact fees pursuant to Section 65995 (3)(h) of the California Government Code. Therefore, impacts would be less than significant.

Mitigation Measures. No mitigation would be required.

Significance After Mitigation. Impacts would be less than significant without mitigation.

Threshold 1.iv:	*Result in substantial adverse physical impacts associated with the provision of new or physically altered government and public service facilities, need for new or physically altered government facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable services ratios, response times or other performance objectives for other public facilities.*

Impact PS-4 The proposed project would generate new residences that may utilize the Harrison Memorial Library and/or the Carmel Valley Branch Library. However, this increase in population would not trigger the need to construct new library facilities or altered library facilities. Therefore, Impacts would be Class III, *less than significant*.

There are two libraries within the project area, the Harrison Memorial Library, which is approximately 1.5 miles from the project site, and the Carmel Valley Branch Library, which is 10 miles east of the project site. The Harrison Memorial Library serves 106,000 locals and visitors from the community. As described previously, the proposed project would result in a population increase of approximately 69 to 102 residents. An increase in population could place greater demands on existing library resources and programs. However, the County's library facilities, which include the Carmel Valley Branch Library, are designed to accommodate use associated with buildout of the County's General Plan. The Monterey County population is expected to increase by 57,908 residents by 2035 (AMBAG, 2014a). The proposed project's population increase of up to 102 residents would represent less than 1% of anticipated population growth Countywide. As such, the additional service population resulting from the proposed project would be accommodated within the existing General Plan projections and would not generate significant demand for library facilities beyond that anticipated in the current adopted General Plan. Impacts would be less than significant.

Mitigation Measures. No mitigation measures are required.

Significance After Mitigation. Impacts would be less than significant without mitigation.

c. Cumulative Impacts

Fire Protection and Ambulance Services. This cumulative analysis considers the project in the context of the service area of CFPD, as this agency would serve the project. The CFPD provides fire and ambulance services to the unincorporated Monterey County, including the project site. As described previously, the project's population would represent less than one 1% of anticipated population growth within the CFPD service area.

The project, in combination with other past, present, and reasonably foreseeable cumulative development, would result in increases in demand for fire protection as well as increases in service population and population that could impact response times for fire protection and emergency service provision. This could trigger the need to construct new or expanded fire protection and emergency response facilities to house the additional staff and equipment needed to serve this additional demand, which could result in potentially significant impacts. However, this growth has been anticipated in the County's current adopted General Plan; in addition, the County of Monterey has adopted an impact fee that can be used to help offset the costs associated with constructing and equipping new fire protection and emergency response facilities that are necessary to support future growth. Although a new fire station is not anticipated at this time, if new facilities needed to be constructed in the future, appropriate environmental review would be required under CEQA, which would address cumulative impacts to fire and ambulance services. Furthermore, the exact location of future facilities is currently unknown and therefore it is not possible to evaluate their environmental impacts at this time. In addition, all developments would otherwise be required to coordinate with the CFPD to identify specific service needs and ensure that adequate facilities are provided for, as contemplated in the 2035 General Plan Update and the County's development impact fee ordinance. Also, the County's General Plan contains a number of policies to help ensure that adequate fire protection facilities are in place to support new development. These policies would be enforced and implemented during the individual development review process for each cumulative project.

Therefore, while cumulative development would result in a cumulative increase in demand for fire protection services and related facilities, this anticipated increase has already been accounted for and accommodated through the County's development impact fee process and the County's General Plan. Further, while the project would contribute to this cumulative increase, it would be required to pay the applicable development impact fees to cover its proportionate fair share of any such new facilities that are needed to support future growth and as such, its contribution would not be cumulatively considerable.

Police Protection. This cumulative analysis considers the project in the context of the service area of the Monterey County Sheriff's Office, as this is the agency that would serve the project. The Department provides police protection to the County of Monterey. The County's General Plan takes into account the entire unincorporated area; in total, this would include approximately 57,908 additional residents, 18,557 additional housing units in the County, and approximately 1,241 less residents, and 861 additional housing units in the unincorporated County (AMBAG, 2014a). The proposed project's population would represent less than one 1% of anticipated population growth within the Department's service area.

The project, in combination with other past, present, and reasonably foreseeable cumulative development, would result in increases in service population. This could trigger the need to construct new or expanded police enforcement facilities to house the additional staff and equipment needed to serve this additional population, which could result in potentially significant impacts. However, this growth has been anticipated in the County's General Plan; in addition, the County of Monterey has adopted an impact fee that can be used to help offset the costs associated with constructing and equipping new public service facilities that are necessary to support future growth. Although not anticipated at this time, if new facilities needed to be constructed in the future, appropriate environmental review would be required under CEQA. Furthermore, the potential location of future facilities is currently unknown and therefore it would be speculative to evaluate their environmental impacts at this time. In addition, all developments would otherwise be required to coordinate with the Sheriff's Office to identify specific service needs and ensure that adequate facilities are provided for, as contemplated in the General Plan and the County's development impact fee ordinance. Also, the County's General Plan contains a number of policies to help ensure that adequate law enforcement facilities are in place to support new development. These policies would be enforced and implemented during the individual development review process for each cumulative project.

Therefore, while cumulative development would result in a cumulative increase in demand for law enforcement services and related facilities, this anticipated increase has already been accounted for and accommodated through the County's development impact fee process and the County's General Plan. Further, while the project would contribute to this cumulative increase, it would be required to pay the applicable development impact fees to cover its proportionate fair share of any such new facilities that are needed to support future growth and as such, its contribution would not be cumulatively considerable.

Schools. This cumulative analysis considers the project in the context of the service area of Carmel River Elementary School, Carmel Middle School, and Carmel High School, as these are the schools that would serve the project. Envisioned future development in accordance with buildout projections would increase enrollment and may significantly impact facilities at these schools, thus triggering the need for new or expanded facilities to accommodate this additional demand. However, this cumulative development has been accounted for in the County's General Plan. With the addition of the students generated by the project, Carmel River Elementary School, Carmel Middle School, and Carmel High School would maintain excess capacity for cumulative development. The addition of five students as a result of the proposed project would contribute to less than 1% increase in CUSD enrollments. While cumulative development would also contribute to school enrollments, each future development project would be required to pay applicable SB 50 fees, which would help to reduce said cumulative impacts. If such funding were to be used for the development of new facilities or the expansion of existing facilities, these future developments would undergo CEQA review as appropriate. While the proposed project would contribute incrementally to the cumulative impacts, it would be required to pay the applicable SB 50 fees, further reducing its impacts in this regard. Accordingly, the project's contribution to any cumulative impacts in this regard would not be cumulatively considerable.

Library Services and Facilities**.** This cumulative analysis considers the project in the context of the County's total available library facilities, as these are the facilities that would

serve the proposed project. Monterey County Free Libraries consists of 17 libraries throughout the County. Additional service population from cumulative development would increase demands for library services and facilities, which could result in potentially significant impacts. However, this growth has been anticipated in the County's General Plan. Although not anticipated at this time, if new facilities needed to be constructed in the future, appropriate environmental review would be required under CEQA. Furthermore, the exact location of future facilities is currently unknown and therefore it is not possible to evaluate their environmental impacts at this time. In addition, all developments would otherwise be required to coordinate with the County to identify specific service needs and ensure that adequate facilities are provided for, as contemplated in the General Plan.

Furthermore, the proposed project's population would represent only less than 1% of anticipated population growth. As such, the additional service population resulting from the proposed project would be accommodated within the existing General Plan projections and would not generate significant demand for library facilities beyond that anticipated in the General Plan. While the proposed project would contribute incrementally to the cumulative impacts, its contribution would be nominal. Accordingly, the project's contribution to any cumulative impacts in this regard would not be cumulatively considerable.

This page intentionally left blank.

4.13 RECREATION

4.13.1 Summary

Table 4.13-1 summarizes the identified environmental impacts, proposed mitigation measures, and residual impacts of the proposed project with regard to recreation. Additional detail is provided in Section 4.13.3 (Impact Analysis).

Table 4.13-1
Impact and Mitigation Summary: Recreation

Impact	Mitigation Measures	Residual Impact
Impact REC-1 The proposed project would generate demand for parkland. However, adequate parkland in the County and in the vicinity of the project site is available to meet this demand. As such, the construction of new facilities would not be required, and substantial physical deterioration of existing facilities would not occur. Impacts would be Class III, less than significant.	No mitigation is required.	Impacts would be less than significant without mitigation.

4.13.2 Affected Environment

a. Environmental Setting

Regional Overview. The County includes a wide array of dedicated recreational and open space resources, including natural and public resources, recreational facilities, and open spaces. Open spaces include beaches, undeveloped coastal dunes, wetlands, dramatic rocky shoreline, redwood forest areas, and coastal peaks. According to the General Plan's Public Services Element, almost 14% of the County's land area is devoted to parks and recreation facilities operated by various governmental agencies, such as State Parks, National Parks, National Forests, Federal Bureau of Land Management, and Local Park Agencies/Districts. The County parks system makes up about 10% of the County's total park acreage (County of Monterey, 2013). These areas consist of the northern portion of the Los Padres Forest, the Ventana Wilderness, Pinnacles National Park, Elkhorn Reserve, twenty State Parks, several parks managed by the Monterey Peninsula Regional Parks District (MPRPD), nine Monterey County Parks, and two County Lakes (Monterey County Planning and Building Inspection Department, 2007).

Local Recreation Resources. The project site is located within Carmel Valley, an unincorporated area of Monterey County, north of the Carmel River. Carmel Valley Road, 0.2 mile north of the site, provides residents and visitors access to active and passive recreational opportunities (County of Monterey, 2013). There are 15 public or quasi-public recreational resources, including golf courses, within the vicinity of the site. These recreational resources are listed in Table 4.13-2 and include beaches, active parks, and passive open spaces managed and maintained by various entities, including the State Parks Department, County of Monterey, City of Carmel-by-the-Sea, and MPRPD.

Table 4.13-2
Local Open Spaces and Public Recreation Resources

#	Recreation Facility	Managed By	Approximate Distance from Project (miles)	Activities
1	Jacks Peak County Park	Monterey County Park	1.9	8.5 miles of forested hiking and horseback riding trails, pack animals, nature study, photography, and picnics
2	Palo Corona Regional Park	MPRPD	0.8	Hiking
3	Point Lobos Ranch	California State Parks	1.5	Variety of hiking trails, docent led hikes, wildlife and bird watching and picnic areas and photography
4	Carmel Valley Ranch	Golf Course	5.5	Horse rides, organic gardens, and bee keeping, hiking, tennis, golf
5	Garland Ranch Regional Park	MPRPD	7.7	Access to the Carmel River, Garzas Creek. A redwood canyon, and waterfall. Mountain biking horseback riding, and hiking
6	Mission Trail Park	City of Carmel	1.0	Hiking
7	Carmel River State Beach	California State Beach	0.6	Beach going, bird watching and scuba diving
8	Carmel Beach City Park	City of Carmel	1.5	Public beach and scenic viewing areas
9	Garrapata State Park	California State Parks	3.0	Two miles of beachfront and 2,879 acres of coastal wilderness and trails
10	Devendorf Park	City of Carmel-by-the-Sea	1.4	Lawn, events, and picnics
11	Picadilly Park	City of Carmel-by-the-Sea	1.5	Drought tolerant and rare plant garden
12	Forest Hills Park	City of Carmel-by-the-Sea	1.7	Playground, shuffleboard court, horseshoes, sand-volleyball court, BBQ and picnic tables
13	First Murphy Park	City of Carmel-by-the-Sea	1.7	Native Plant Garden, benches, walking paths, and historic Murphy House (1902)
14	Carmel Middle School	City of Carmel-by-the-Sea	0.2	Multi-purpose school facilities for public use during off-school hours for community events and various recreational activities
15	Hatton Canyon State Park	California Department of Parks and Recreation	0.25	A new park that is not yet available for public use, due to necessary planning, facility development and staffing

Sources: Monterey Peninsula Regional Park District, 2016.

The South Bank Trail, located between Quail Lodge and Palo Corona Regional Park approximately 0.5 mile southeast of the site, is the closest formal public trail to the project site. However, the Carmel River intercepts direct access to the trail from the project site. The Hatton Trail is a bike path west of the project site that connects to Hatton Canyon State Park. The Hatton Canyon State Park is a new state park that will be available to the public when the

facilities are developed and staffing occurs (California Department of Parks and Recreation, 2016). Facilities at Carmel Middle School, located approximately 500 feet east of the northeastern corner of the site, are also available for public recreational use.

b. Regulatory Setting. Recreational resources in the County are managed through the Monterey County General Plan, including the Land Use Element and Public Services Element. The Land Use Element designates recreational land uses, including open space, recreation, and public/quasi-public uses. The Public Services Element addresses countywide critical infrastructure and service issues, including parks. Within the County, the Carmel Valley Master Plan further addresses specific recreational and park uses in Carmel Valley.

Monterey County General Plan. The Land Use Element guides land use and development Countywide. For recreational land uses, this Element provides specific guidelines for location and use of recreational facilities and public open spaces. The following goal and policies apply to public open space and recreation in rural residential areas:

> **Goal LU-8:** Encourage the provision of open space lands as part of all types of development, including residential, commercial, industrial, and public.
>
> > **Policy LU-8.1:** The open space needs of the community and new development shall be reviewed and addressed through the planning process. The extent of use of land for this designation shall be limited to building coverage of 25% of the subject property.

The Public Services Element defines public infrastructure and services in the County, including public parks and open spaces. The Public Services Element provides goals, policies, and programs to maintain and develop public services to meet the needs of the County. The following goal and policies apply to public open space and recreation in rural areas:

> **Goal PS-7:** Promote a range of educational opportunities within existing **a**nd future population centers.
>
> > **PS-7.3:** The cost-effective use of multi-purpose school facilities during off-school hours for community meeting space and recreation space shall be encouraged.
>
> **Goal PS-11:** Maintain and enhance the County's parks and trails system in order to provide recreational opportunities, preserve natural scenic resources and significant wildlife habitats, and provide good stewardship of open space resources.
>
> > **PS-11.10:** Pursuant to the provisions of the State Subdivision Map Act, residential subdivision projects shall be conditioned to provide and maintain park and recreation land and facilities, or pay in-lieu fees, in proportion to the extent of need created by the development.

Carmel Valley Master Plan. The following policies apply to public open space and recreation in Carmel Valley:

Policy CV-51.2.7 Recreation in lieu fees obtained from minor and standard subdivisions should be used to acquire or develop land for active recreation uses.

4.13.3 Impact Analysis

a. Methodology and Significance Thresholds. Assessment of environmental consequences on recreation resources involved a qualitative evaluation of the potential to conflict with existing and planned park and recreation facilities or to increase demand for recreation facilities.

In accordance with Appendix G of the *State CEQA Guidelines,* the proposed project would have a significant impact to recreation if it would result in any of the following:

1. *Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated; or*
2. *Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment; and/or*
3. *Result in substantial adverse physical impacts associated with the provision of new or physically altered government facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other objectives for parks.*

b. Project Impacts and Mitigation Measures

Threshold 1:	*Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.*
Threshold 2:	*Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment.*
Threshold 3:	*Result in substantial adverse physical impacts associated with the provision of new or physically altered government facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other objectives for parks.*

Impact REC-1 The proposed project would generate demand for parkland. However, adequate parkland in the County and in the vicinity of the project site is available to meet this demand. As such, the construction of new facilities would not be required, and substantial physical deterioration of existing facilities would not occur. Impacts would be Class III, *less than significant.*

The proposed project would construct 31 residential units, including 24 market-rate single-family units and seven inclusionary units. Based on the average persons per household shown in Table 4-11.4 in Section 4.11, *Population and Housing*, the proposed addition of 31 residential units would generate an increase of approximately 56 to 102 residents.

Section 19.12.010 of the Monterey County Subdivision Ordinance establishes a standard of is three acres of parkland per 1,000 residents, or 0.003 acres per person. Monterey County has over 290,000 acres of land devoted to park and recreational facilities (County of Monterey, 2010). Based Department of Finance's 2016 Monterey County population estimate, the current ratio of parkland per resident is nearly 0.7 acre per person, which indicates that the County is not only meeting, but greatly exceeding its parkland standard.

Based on the average persons per household shown in Table 4.11-4 in Section 4.11, *Population and Housing*, the proposed project would add an estimated 56 to 102 residents on the site, thus generating a parkland demand of up to 0.3 acre. When incorporated into the countywide figures, project demand would not alter the existing ratio of 0.7 acre of parkland per County resident. As such, project-generated demand would be adequately met by existing County and regional parks.

Also, Policy 51.2.7 of the CVMP states that recreation in lieu fees obtained from minor and standard subdivisions should be used to acquire or develop land for active recreation uses. The proposed project would be obligated to pay development impact fees that would be used for park facility maintenance or development of new park facilities at sites identified by the CVMP. Therefore, the proposed project would have a less than significant impact on existing neighborhood and regional parks or other recreational facilities.

Mitigation Measures. No mitigation is required.

Significance After Mitigation. This impact would be less than significant without mitigation.

c. Cumulative Impacts. Projected planned and pending development in the Carmel Valley would add new residents and workers to the existing population in unincorporated Monterey County. As shown in Table 3-1 in Section 3.0, *Environmental Setting*, cumulative development in Carmel Valley, including the proposed project, would add an estimated 524 dwelling units to the Valley. Based on the current average number of persons per household in the area (approximately 1.81-3.30 persons per household), these new residences would increase the area's population by approximately 948 to 1,729 residents. It should be noted, however, that CVMP Policy CV-1.6 limits new residential subdivisions in Carmel Valley to 190 units, which would limit the amount of population growth in the Valley. Whether restricted or not, the cumulative increase in population would increase the demand for parks and recreational facilities. However, all new developments would be required to either provide on-site park facilities or pay in-lieu fees to offset the increase in demand. With collection of required fees on all new development and use of these fees to provide new facilities to serve additional demand, cumulative impacts to parks and recreation would be less than significant.

This page intentionally left blank.

4.14 TRANSPORTATION AND CIRCULATION

4.14.1 Summary

Table 4.14-1 summarizes the identified environmental impacts, proposed mitigation measures, and residual impacts of the proposed project with regard to transportation and circulation. Additional detail is provided in Section 4.14.7 (Impact Analysis).

Table 4.14-1
Impact and Mitigation Summary: Transportation and Circulation

Impact	Mitigation Measures	Residual Impact
Impact T-1 The proposed project would result in potentially significant impacts to three study intersections and two study road segments under Existing plus Project conditions. Planned improvements and required mitigation would potentially eliminate some of these impacts; however, funding and timing of these improvements cannot be guaranteed. In addition, mitigation for one intersection and two road segments is not feasible. Therefore, project impacts under Existing plus Project conditions would be Class I, significant and unavoidable.	Based on the impact analysis in the TIA and summarized above, three intersections and two roadway segments require mitigation under Existing plus Project conditions. This includes intersections #3, #7, and #8, and road segments #1 and #3. The TAMC Regional Transportation Plan (RTP) includes a list of projects to improve traffic operations within the project study area. Planned improvements include: 1. Add a second northbound through lane on Highway 1 between Rio Road and Carmel Valley Road 2. Highway 1/Rio Road Intersection: a. Convert the northbound right-turn lane to a shared through/right-turn lane b. Add a second westbound right-turn lane c. Add an exclusive southbound right-turn lane 3. Highway 1/Carmel Valley Road Intersection: a. Convert the northbound right-turn lane to a shared through/right-turn lane The above planned improvements would eliminate the proposed project's impact to intersection #3 (Highway 1/Rio Road) and road segment #3 (Highway 1 between Carmel Valley Road and Rio Road) in the northbound direction. Project-specific impacts to intersection #8 (Highway 1/Carpenter Street) and segment #1 (Highway 1 between Carpenter Street and Ocean Avenue) in the northbound direction could potentially be reduced with the addition of a northbound	Project impacts to the following intersections and road segments would remain significant and unavoidable under the Existing plus Project conditions: • Intersection #3 • Intersection #7 • Intersection #8 • Road segment #1 (northbound and southbound) • Road segment #3 (northbound and southbound)

Table 4.14-1
Impact and Mitigation Summary: Transportation and Circulation

Impact	Mitigation Measures	Residual Impact
	right-turn lane at Highway 1 and Carpenter Street. However, as intersection #8 and road segment #1 both operate deficiently without the project, the project applicant would be responsible for a fair share contribution only. As shown in Figure 4.11-4, the project's contribution to this intersection would be seven trips during the AM peak hour and nine trips during the PM peak hour, none of which would turn right from Highway 1 onto Carpenter Street. The improvement is not planned within the TAMC RTP or other regional document, and there is no funding established for this improvement. Thus, there is no mechanism into which the applicant could pay a fair share to ensure the improvement is constructed. Further, the improvement would be within Caltrans jurisdiction, and would therefore be beyond the control of the project applicant and/or the County of Monterey. For these reasons, this TIA-identified mitigation is considered infeasible and is not included herein. It should also be noted that, with such an improvement, LOS D operations would continue at intersection #8: a northbound right-turn lane would reduce delays to pre-project conditions, but would not improve operations to an acceptable LOS.	
Impact T-2 Implementation of the proposed project would result in potentially significant impacts to three study intersections and five study road segments under Background plus Project conditions. Planned improvements and required mitigation would potentially eliminate some of these impacts; however, funding and timing of these improvements cannot be guaranteed. In addition, mitigation for one intersection and five road segments is not feasible. Therefore, project impacts under Background plus Project conditions would be Class I, significant and unavoidable.	Based on the impact analysis in the TIA and summarized above, three intersections and five roadway segments require mitigation under Background plus Project conditions. This includes intersections #3, #7, and #8, and road segments #1, #2, #3, #6, and #7. As described previously, the TAMC RTP includes a list of projects to improve traffic operations within the project study area that would eliminate the proposed project's impact to intersection #3 (Highway 1/Rio Road) and road segment #3 (Highway 1 between Carmel Valley Road and Rio Road) in the northbound direction. While the addition of a northbound right-turn lane at SR and Carpenter Street would eliminate project-specific	Project impacts to the following intersections and road segments would remain significant and unavoidable under Background plus Project conditions: • Intersection #3 • Intersection #7 • Intersection #8 • Road segment #1 (northbound and southbound) • Road segment #2 • Road segment #3 (northbound and southbound) • Road segment #6 • Road segment #7

Table 4.14-1
Impact and Mitigation Summary: Transportation and Circulation

Impact	Mitigation Measures	Residual Impact
	impacts to intersection #8 (Highway 1/Carpenter Street) and segment #1 (Highway 1 between Carpenter Street and Ocean Avenue) in the northbound direction, this improvement is not considered feasible for the reasons described under *Mitigation Measures* for Impact T-1. No other mitigation is feasible to reduce project impacts under Background plus Project Conditions.	
Impact T-3 Implementation of the proposed project would result in potentially significant impacts to four study intersections and six study road segments under Cumulative plus Project conditions. Impacts to all four intersections and four of the road segments would be less than significant upon payment of regional traffic impact fees. However, impacts to the remaining two road segments cannot be mitigated. Therefore, project impacts under Cumulative plus Project conditions would be Class I, significant and unavoidable.	Based on the impact analysis in the TIA and summarized above, four intersections and six roadway segments require mitigation under Background plus Project conditions. This includes intersections #1, #3, #7, and #8, and road segments #1, #2, #3, #6, #7, and #13. The TAMC RTP includes a list of projects to improve traffic operations within the project study area that would eliminate the proposed project's impact to intersections #1 (Highway 1/Carmel Valley Road) and #3 (Highway 1/Rio Road). As described previously, the construction of these planned improvements is dependent on STIP funding, which cannot be guaranteed. In addition, there are no planned or feasible improvements to mitigate impacts to intersections #7 (Highway 1/Ocean Avenue) and #8 (Highway 1/Carpenter Avenue). However, both TAMC and Caltrans consider payment of regional development impact fees as adequate mitigation for cumulative impacts to state highways and the regional road network. The project applicant would be required to pay regional fees to the CVTIP, TAMC, and Monterey County, as described under *Funding for Transportation Improvements* in Section 4.14.7(a) (Methodology and Significance Thresholds). Because payment of these fees is required and would mitigate cumulative impacts, impacts to intersections under Cumulative plus Project conditions would be less than significant. For Highway 1 roadway segments – which include study segments #1, #2, and #3 – payment of regional	Impacts to all four impacted intersections (#1, #3, #7, and #8) and road segments #1, #2, #3, and #13 would be less than significant upon payment of regional traffic impact fees. Impacts to segments #6 and #7 would remain significant and unavoidable.

Table 4.14-1
Impact and Mitigation Summary: Transportation and Circulation

Impact	Mitigation Measures	Residual Impact
	fees would similarly reduce project impacts to a less than significant level. For segments #6 and #7, impacts would be eliminated by widening Carmel Valley Road to four lanes. However, this improvement is not considered feasible and is therefore not required as mitigation. For segment #13, project impacts would be eliminated with planned improvements in the TAMC RTP. No further mitigation is required.	

This section presents the key assumptions, methods, and results of analysis for the transportation and circulation impacts of the proposed project. This section is based on, among other things, the *Val Verde Subdivision Traffic Impact Analysis* (TIA) prepared by Hatch Mott MacDonald (June 2016). This report is included in Appendix I and contains the traffic counts, level of service (LOS) calculations, and a detailed description of the traffic forecasting done for the analysis.

The project TIA analyzed the traffic impacts of the proposed project on the surrounding roadway network. The study included the evaluation of the following intersections:

1. State Route (SR) 1/Carmel Valley Road
2. Carmel Rancho Boulevard/Carmel Valley Road
3. Rio Road/Highway 1
4. Crossroads Boulevard/Rio Road
5. Carmel Center Place/Rio Road
6. Carmel Rancho Boulevard/Rio Road
7. Highway 1/Ocean Avenue
8. Highway 1/Carpenter Street
9. Carmel Rancho Boulevard/Shopping Center Driveway

The study included the evaluation of the following road segments:

1. Highway 1, Carpenter Street to Ocean Avenue
2. Highway 1, Ocean Avenue to Carmel Valley Road
3. Highway 1, Carmel Valley Road to Rio Road
4. Highway 1, Rio Road to Ribera Road
5. Rio Road, west of Highway 1
6. Carmel Valley Road, Robinson Canyon Road to Schulte Road
7. Carmel Valley Road, Schulte Road to Rancho San Carlos Road
8. Carmel Valley Road, Rancho San Carlos Road to Rio Road
9. Carmel Valley Road, Rio Road to Carmel Rancho Boulevard
10. Carmel Valley Road, Carmel Rancho Boulevard to Highway 1
11. Carmel Rancho Boulevard, Carmel Valley Road to Shopping Center Driveway

12. Carmel Rancho Boulevard, Shopping Center Driveway to Rio Road
13. Rio Road, Highway 1 to Crossroads Boulevard
14. Rio Road, Crossroads Boulevard to Carmel Center Place
15. Rio Road, Carmel Center Place to Carmel Rancho Boulevard

The study intersections are shown in Figure 4.14-1.

4.14.2 Existing Transportation Setting

a. Existing Roadway Network. The key roadways in the vicinity of the proposed project are described below:

State Route (Highway) 1 provides regional access to the project site. Highway 1 is a major north-south roadway that connects the Monterey Peninsula with San Luis Obispo County to the south, and with Santa Cruz County and the San Francisco Bay Area to the north. Highway 1 is a four-lane freeway north of Carpenter Street, a four- to five lane (the five-lane section has a two-way center left-turn lane) roadway between Carpenter Street and Ocean Avenue, a three-lane roadway (two lanes northbound and one lane southbound) between Ocean Avenue and Carmel Valley Road, and a two-lane roadway south of Carmel Valley Road. Highway 1 is part of the Monterey County Congestion Management Program (CMP) highway network and is designated as a State Scenic Highway. The speed limit on Highway 1 in the vicinity of the project is 45 miles per hour.

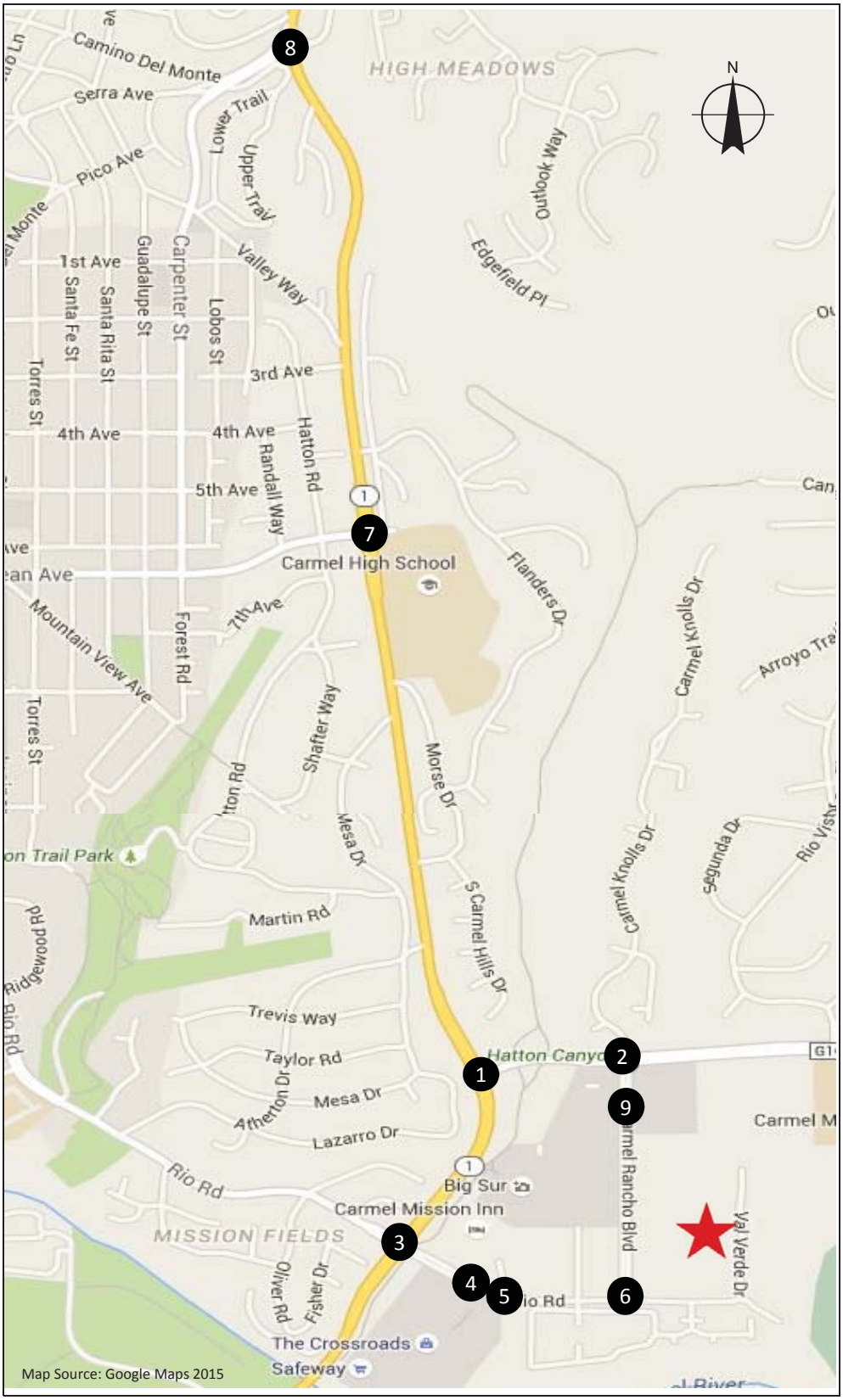
Local access to the site is provided by Carmel Valley Road, Rio Road, Carmel Rancho Boulevard and Val Verde Drive. These roadways are described below.

Carmel Valley Road is an east-west roadway that begins at Highway 1 and continues east to the City of Greenfield. Carmel Valley Road has four lanes from Highway 1 to approximately 1,800 feet west of Rancho San Carlos Road. Carmel Valley Road has two lanes east of Rancho San Carlos Road. Carmel Valley Road is classified as a major arterial. The speed limit on Carmel Valley Road in the vicinity of the project is 45 miles per hour.

Rio Road includes two discontinuous segments of roadway east and west of the project site. The eastern part is a short north-south two-lane segment that connects to Carmel Valley Road and provides access to Rancho Canada Golf Club and the Community Church of the Monterey Peninsula. The western part is an east-west roadway with two lanes between Highway 1 and Junipero Street, and four lanes between Highway 1 and Val Verde Drive. Rio Road would provide access to the project site via Val Verde Drive. The speed limit on Rio Road in the vicinity of the project is 25 miles per hour.

Carmel Rancho Boulevard is a four-lane north-south roadway that extends from Carmel Valley Road to Rio Road. It provides access to various commercial developments and also serves through traffic between Carmel Valley Road and Highway 1 south of Rio Road. The speed limit on Carmel Rancho Boulevard in the vicinity of the project is 35 miles per hour.

Val Verde Drive is a two-lane unimproved road that runs north-south for approximately one-quarter mile north of the western portion of Rio Road. Val Verde Drive provides access to



Project Location

Source: Hatch Mott MacDonald, 2016

Study Intersections

Figure 4.14-1

several single-family homes and would provide direct access to the project site. There is no posted speed limit on Val Verde Drive.

b. Existing Bicycle, Pedestrian, and Transit Facilities. The County of Monterey adopted the Monterey County Bikeway Plan in 2008 and the Transportation Agency for Monterey County (TAMC) adopted their Bicycle and Pedestrian Master Plan in 2011. These documents designate routes along roadways that can be used by bicycling commuters and recreational riders for safe access to major employers, shopping centers, and schools. Consistent with State and Federal designations, there are three basic types of bicycle facilities. Each type is described below:

1. *Bike path (Class I)* - A completely separate right-of-way designed for the exclusive use of cyclists and pedestrians, with minimal crossings for motorists.
2. *Bike lane (Class II)* - A lane on a regular roadway, separated from the motorized vehicle right-of-way by paint striping, designated for the exclusive or semi-exclusive use of bicycles. Bike lanes allow one-way bike travel. Through travel by motor vehicles or pedestrians is prohibited, but crossing by pedestrians and motorists is permitted.
3. *Bike route (Class III)* - Provides shared use of the roadway with motorists, designated by signs or permanent markings.

In the vicinity of the proposed project, Class II bike lanes are provided on the north side of Carmel Valley Road east of Carmel Rancho Boulevard, and on the south side Carmel Valley Road east of Carmel Middle School.

Sidewalks in the vicinity of the project site are provided on portions of Rio Road between Val Verde Drive and Highway 1 and a Class I multi-use path is provided on the east side of Highway 1 beginning at the Crossroads Shopping Center and continuing north to Canyon Drive.

The primary public transit service in the County of Monterey is the bus service provided by Monterey-Salinas Transit (MST). In the vicinity of the project site, MST Route 24 provides bus service along Rio Road, Carmel Rancho Boulevard, and Carmel Valley Road between Carmel Valley Village and the Monterey Transit Plaza with 60-minute headways during weekday peak hours. MST Route 94 provides bus service along Rio Road and Carmel Rancho Boulevard to and from Carmel-by-the-Sea with about 30 minute headways during weekday mornings between about 7:00 and 9:00 a.m. Bus stops within the study area are located on Carmel Rancho Boulevard north and south of Clock Tower Lane and on Rio Road between Carmel Center Place and Via Nona Marie.

4.14.3 Existing Conditions

a. Intersection Operations. New weekday AM and PM peak hour turning movement counts were conducted at all nine study intersections in July and August 2015. A review of the new traffic volumes showed that the new volumes were lower than previously published volumes from other traffic studies at a majority of the study intersections. As a result, adjustments were made to proportionally increase the volumes per the previous (higher) volumes. The adjusted volumes were then balanced where appropriate between study intersections, with consideration given to driveways and intersections between study

intersections. The new raw counts and a comparison of the new raw counts, the previously published volumes, and the adjusted and balanced volumes are shown in Appendix D to the TIA, which is included in this EIR as Appendix I.

The Existing conditions peak hour traffic volumes used in the analysis are presented in Figure 4.14-2. Intersection levels of service are summarized in Table 4.14-2.

Table 4.14-2
Existing Conditions Intersection Levels of Service

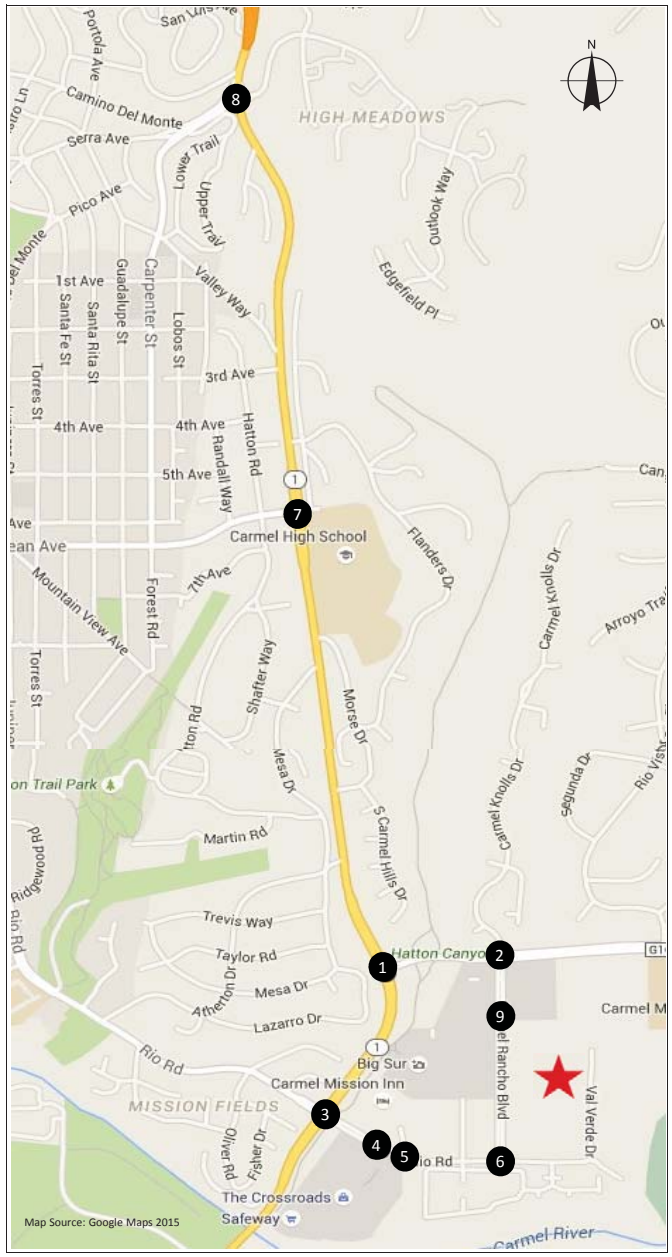
	Intersection	Control Type	Jurisdiction	LOS Standard	AM Peak Hour		PM Peak Hour	
					Delay (sec)	LOS	Delay (sec)	LOS
1	Highway 1/Carmel Valley Rd	Signal	Caltrans	C/D	11.3	B	18.1	B
2	Carmel Rancho Blvd/Carmel Valley Rd	Signal	CVMP	C	16.9	B	19.3	B
3	Highway 1/Rio Rd	Signal	Caltrans	C/D	22.6	C	37.9	**D**
4	Crossroads Blvd/Rio Rd	Signal	CVMP	C	9.9	A	12.0	B
5	Carmel Center Place/Rio Rd	Signal	CVMP	C	9.3	A	6.0	A
6	Carmel Rancho Blvd/Rio Rd	Two-Way Stop SB	CVMP	C	10.2	B	10.7	B
		EB			7.7	A	8.1	A
		WB			15.2	C	19.8	C
7	Highway 1/Ocean Ave	Signal	Caltrans	C/D	43.6	**D**	37.1	**D**
8	Highway 1/Carpenter St	Signal	Caltrans	C/D	23.8	C	47.1	**D**
9	Carmel Rancho Blvd/Shopping Center Dwy	Signal	CVMP	C	4.0	A	5.5	A

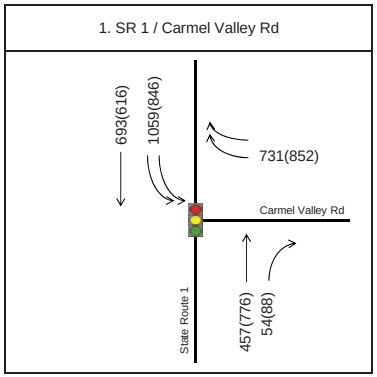
Source: Hatch Mott MacDonald, 2016.
Note: Bold indicates an exceedance of the applicable LOS standard.

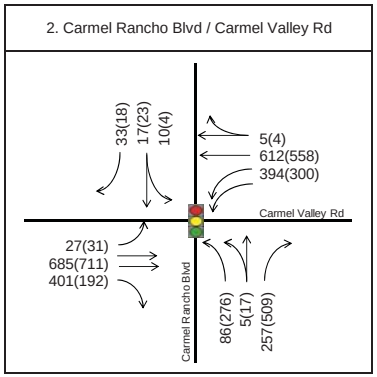
Based on the aforementioned level of service standards, the following study intersections operate at unacceptable levels of service under Existing conditions:

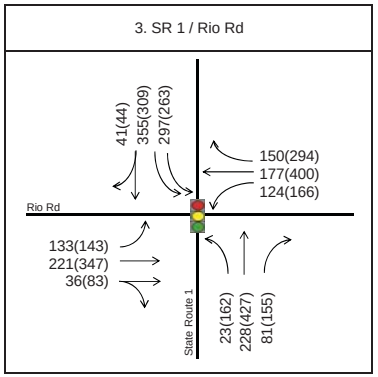
- Intersection #3 – Highway 1/Rio Road (LOS D – PM)
- Intersection #7 – Highway 1/Ocean Avenue (LOS D – AM & PM)
- Intersection #8 – Highway 1/Carpenter Street (LOS D – PM)

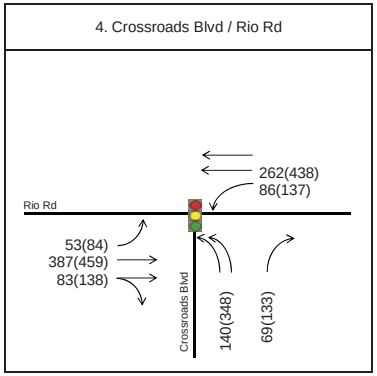
b. Road Segment Operations. Existing peak hour segment volumes for study segments #5 and #11 – #15 were derived from the peak hour intersection volumes described in Section 4.14.7(a) (Methodology and Significance Thresholds) below. In order to be consistent with the Monterey County monitoring program for Carmel Valley Road, existing peak hour segment volumes and ADT's on Carmel Valley Road (segments #6 – #10) were obtained from Monterey County Department of Public Works staff.

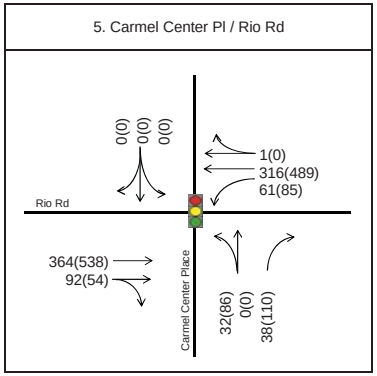


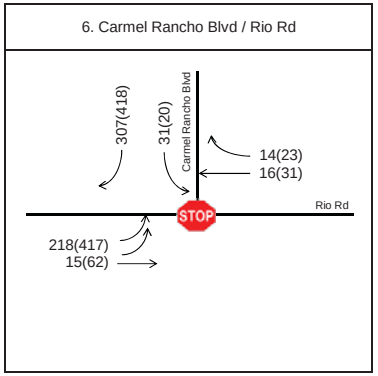


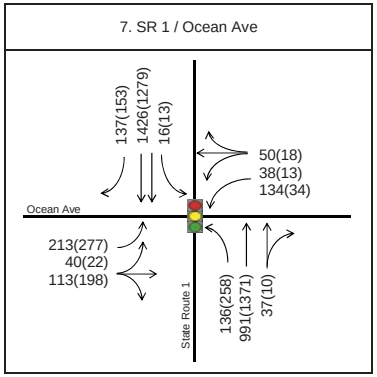


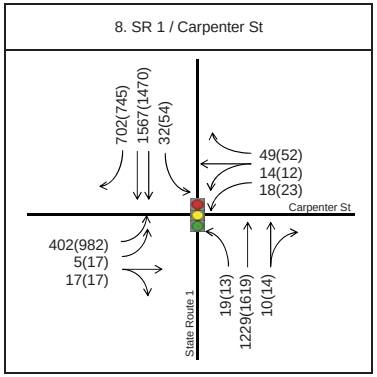


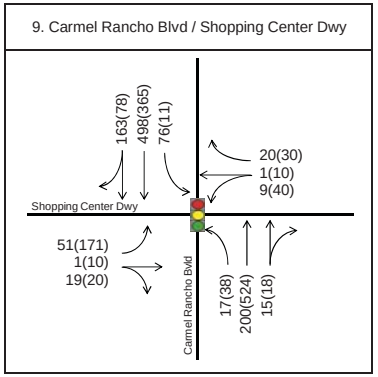












XX(YY) = AM (PM)
Counts conducted 7/15 & 8/15, adjusted & balanced.

Source: Hatch Mott MacDonald, 2016

Existing Conditions AM & PM Peak Hour Volumes

Figure 4.14-2

Road segment levels of service are summarized in Tables 4.14-3 through 4.14-5. LOS calculation worksheets for road segments #5 and #11 - #15 are included as Appendix F to the TIA. Existing peak hour levels of service for study segments #1 - #4 are referenced from the *Rancho Cañada Draft Transportation Impact Study* prepared by CCTC (January 2016).

Table 4.14-3
Existing Conditions Arterial Levels of Service

Seg #	Road Segment	AM Peak Hour		PM Peak Hour	
		Speed	LOS	Speed	LOS
Northbound Carmel Rancho Blvd					
12	Rio Rd to Shopping Center Dwy	27.3	A	24.9	B
11	From Shopping Center Dwy to Carmel Valley Rd	9.5	**D**	8.9	**E**
Southbound Carmel Rancho Blvd					
11	Carmel Valley Rd to Shopping Center Dwy	18.3	C	16.8	C
12	Shopping Center Dwy to Rio Rd	22.9	B	22.6	B
Eastbound Rio Rd					
5	Atherton Dr to Highway 1	17.3	C	17.3	C
13	Highway 1 to Crossroads Blvd	12.9	**D**	11.7	**D**
14	Crossroads Blvd to Carmel Center Pl	12.2	**D**	11.0	**D**
15	Carmel Center Pl to Carmel Rancho Blvd	16.1	C	17.1	C
Westbound Rio Rd					
15	Carmel Rancho Blvd to Carmel Center Pl	20.3	B	19.6	B
14	Carmel Center Pl to Crossroads Blvd	9.6	**D**	8.3	**E**
13	Crossroads Blvd to Highway 1	7.3	**E**	7.2	**E**
5	Highway 1 to Atherton Dr	19.6	B	23.5	B
Northbound Highway 1					
1	Ocean Ave to Carpenter St	-	C	-	**D**
2	Carmel Valley Rd to Ocean Ave	-	C	-	C
3	Rio Rd to Carmel Valley Rd	-	**F**	-	**F**
4	Ribera Rd to Rio Rd	-	B	-	B
Southbound Highway 1					
1	Carpenter St to Ocean Ave	-	**D**	-	C
2	Ocean Ave to Carmel Valley Rd	-	C	-	C
3	Carmel Valley Rd to Rio Rd	-	C	-	**E**
4	Rio Rd to Ribera Rd	-	B	-	B

Source: Hatch Mott MacDonald, 2016. Highway 1 road segment LOS are referenced from CCTC, 2015.
Note: Bold indicates an exceedance of the applicable LOS standard.

Table 4.14-4
Existing Conditions Road Segment 6 and 7 Levels of Service

Seg #	Road Segment	CVMP ADT Threshold	ADT	AM Peak Hour			PM Peak Hour		
				2-Way Volume	PTSF	LOS	2-Way Volume	PTSF	LOS
Carmel Valley Rd									
6	Robinson Canyon Rd to Schulte Rd	15,499	14,611	1,070	85.3%	**E**	1,293	85.3%	**E**
7	Schulte Rd to Rancho San Carlos Rd	16,340	15,974	1,157	87.3%	**E**	1,402	87.7%	**E**

Source: Hatch Mott MacDonald, 2016.
Note: Bold indicates an exceedance of the applicable LOS standard.

Table 4.14-5
Existing Conditions Road Segment 8 - 10 Levels of Service

Seg #	Road Segment	CVMP ADT Threshold	ADT	Direction	AM Peak Hour				PM Peak Hour			
					Volume (veh/hr)	Flow Rate (pcphpl)	Density (pc/mi/ln)	LOS	Volume (veh/hr)	Flow Rate (pcphpl)	Density (pc/mi/ln)	LOS
Carmel Valley Rd												
8	Rancho San Carlos Rd to Rio Rd	48,487	18,982	EB	547	298	5.4	A	900	524	9.5	A
				WB	815	485	8.8	A	727	396	7.2	A
9	Rio Rd to Carmel Rancho Blvd	51,401	24,228	EB	706	393	7.1	A	1,100	606	11.0	B
				WB	993	598	10.9	A	938	506	9.2	A
10	Carmel Rancho Blvd to SrR1	27,839	22,006	EB	944	514	9.3	A	846	442	8.0	A
				WB	789	470	8.5	A	962	530	9.6	A

Source: Hatch Mott MacDonald, 2016.
Note: Bold indicates an exceedance of the applicable LOS standard.

Under Existing conditions, the ADT's on the Carmel Valley Road study segments (#6 – #10) are below the CVMP ADT thresholds.

Based on the LOS standards described in Section 4.14.7(a) (Methodology and Significance Thresholds), the following study road segments operate at unacceptable levels of service under Existing conditions:

- Segment #1 – Highway 1 between Carpenter Street and Ocean Avenue
- Segment #3 – Highway 1 between Carmel Valley Road and Rio Road
- Segment #6 – Carmel Valley Road between Robinson Canyon Road and Schulte Road
- Segment #7 – Carmel Valley Road between Schulte Road and Rancho San Carlos Road
- Segment #11 – Carmel Rancho Boulevard between Carmel Valley Road and Shopping Center Driveway
- Segment #13 – Rio Road between Highway 1 and Crossroads Boulevard
- Segment #14 – Rio Road between Crossroads Boulevard and Carmel Center Place

4.14.4 Proposed Project

a. Proposed Project Trip Generation. The proposed project consists of 24 market rate single family homes and seven inclusionary units (condos or apartments). Trip generation rates for condos and apartments are lower than for single family homes; however, due to the location of the proposed project (i.e., with limited access to regional public transportation), the trip generation rates for single family detached housing was used for all 31 units. This represents a conservative analysis. A trip generation credit was given for the one existing single family house located on the project site.

Trip generation rates published by the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 9th Edition (2012) were used to estimate the trips that would be generated by the proposed project using the ITE land use code for single-family detached housing (210). Table 4.14-6 summarizes the trip generation rates used for the proposed project and Table 4.14-7 summarizes the trip generation volumes for the proposed project.

Table 4.14-6
Project Trip Generation Rates

Land Use Category	Source	ITE Code	Rate Unit	Daily Trip Rate/ Unit[1]	AM Peak Hour Rate/Unit			PM Peak Hour Rate/Unit		
					Total[1]	In %	Out %	Total	In %	Out %
Single-Family Detached Housing	ITE	210	DU	9.52	0.75	25%	75%	1.00	63%	37%

Source: Hatch Mott MacDonald, 2016. The trips illustrated in this table are based on actual ITE Trip Generation (9th Edition) average trip rates.

Table 4.14-7
Project Trip Generation Volumes

Land Use	Units	Quantity	Daily Trips	AM Peak Hour Trips1			PM Peak Hour Trips		
				Total	In	Out	Total	In	Out
Proposed Use									
Single Family Detached Housing	DU	31	295	23	5	17	31	20	11
Credit for Existing Use									
Single Family Detached Housing	DU	-1	-10	-1	o	-1	-1	-1	0
Total Net New Trips			**285**	**22**	**6**	**16**	**30**	**19**	**11**

Source: Hatch Mott MacDonald, 2016. The trips illustrated in this table are based on actual ITE Trip Generation (9th Edition) average trip rates.

As shown in Table 4.14-6, the proposed project is estimated to generate 285 net daily trips, with 22 trips occurring during the AM peak hour (6 in, 16 out) and 30 trips occurring during the PM peak hour (19 in, 11 out).

b. Proposed Project Trip Distribution. The proposed project trip distribution is based on existing traffic patterns, land uses in the study area and engineering judgment. The proposed project trip distribution percentages are shown graphically in Figure 4.14-3.

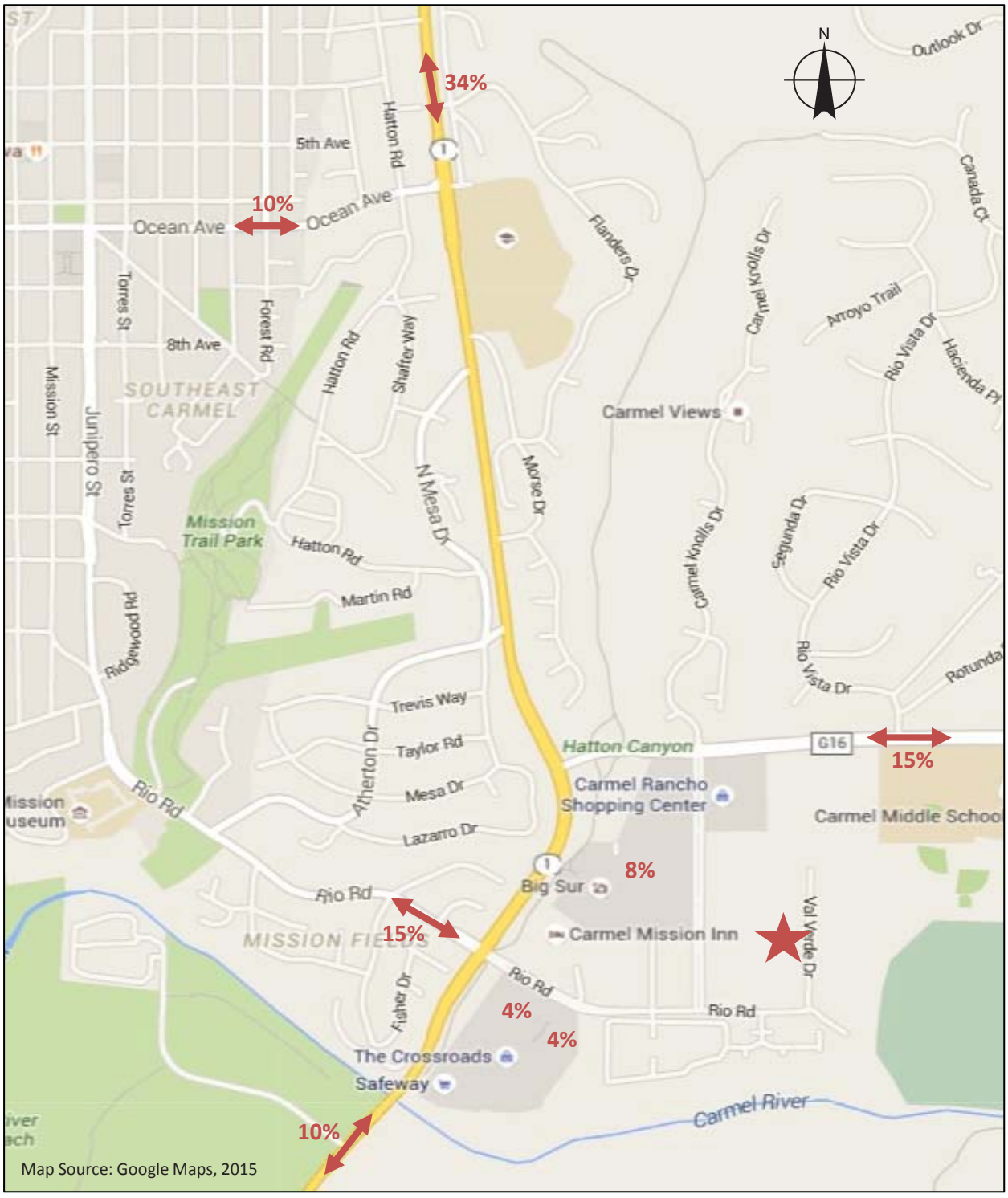
c. Proposed Project Trip Assignment. The trips generated by the proposed project were assigned to the road network using the trip distribution percentages shown in Figure 4.14-2. The proposed project trip assignment is shown in Figure 4.14-4.

4.14.5 Background Conditions

This section of the report describes the analyses of the study road network under Background traffic conditions. Background conditions models traffic conditions with traffic from approved but not yet constructed developments added to the study intersections.

a. Background Traffic Volumes. AM and PM peak hour traffic generated by projects approved for development, but not yet constructed or occupied, was estimated based on trip generation rates within the ITE *Trip Generation* handbook, 9th Edition, 2012. The list of approved but not yet built projects is provided in Appendix G to the TIA with a trip generation estimate for each project. The location of each approved but not yet built project is provided in Appendix H to the TIA. Most of the projects listed in Appendix G to the TIA were approved after 2011 but none of them have commenced with active construction as of July 2016.

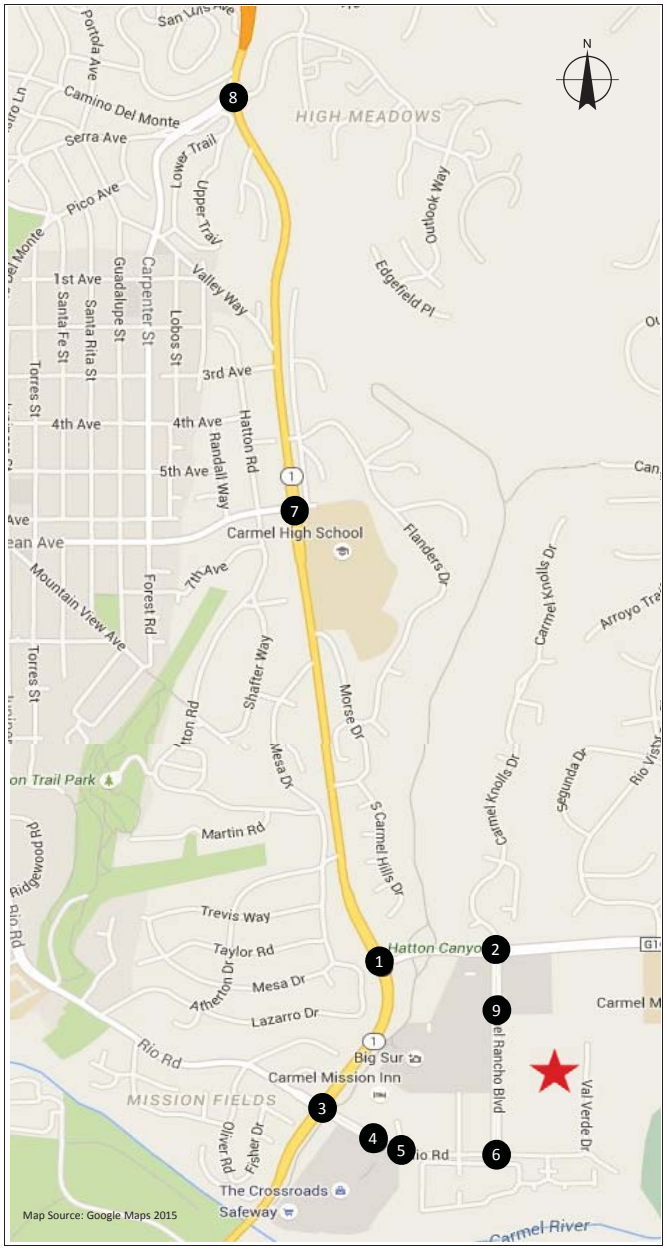
It should be noted that trips generated by the Carmel Canine Sports Center project are included in the Background conditions analysis as this project was considered to be approved at the time of the TIA analysis. The project was subsequently denied and has been removed from the list of approved projects. It was determined that removing the trips generated by the Carmel Canine Sports Center project from the analysis would not change the conclusions of the TIA. As a result, these trips remain in the LOS calculations and the results of the Background analysis can be considered conservative.

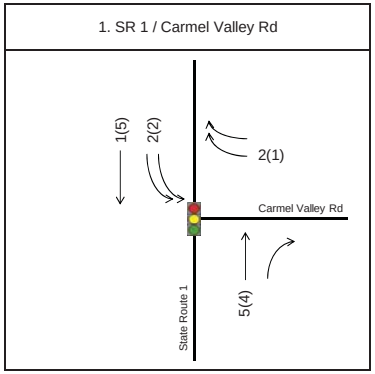


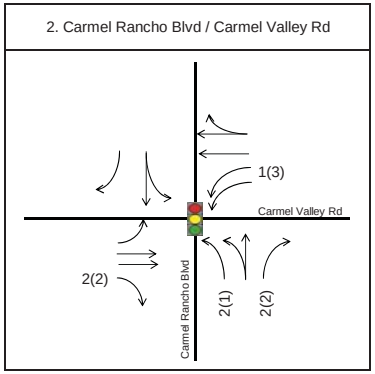
Source: Hatch Mott MacDonald, 2016

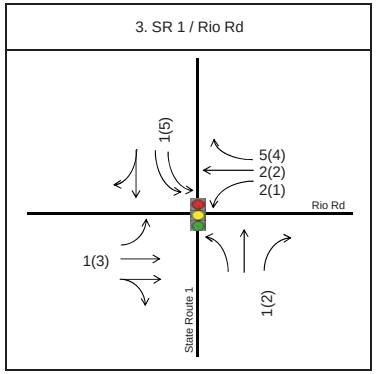
Project Trip Distribution

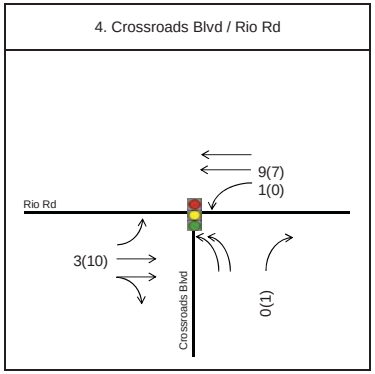
Figure 4.14-3

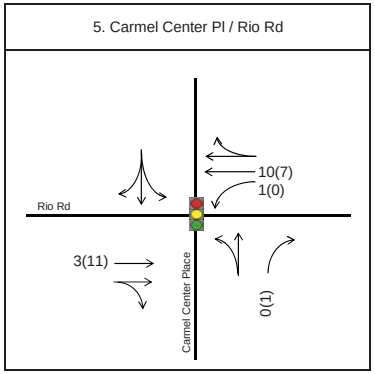


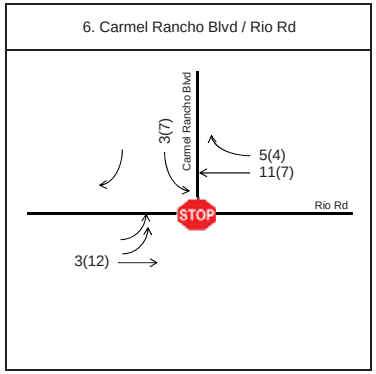


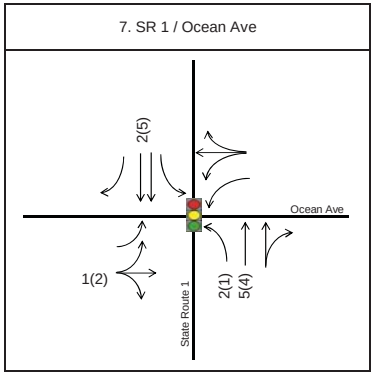


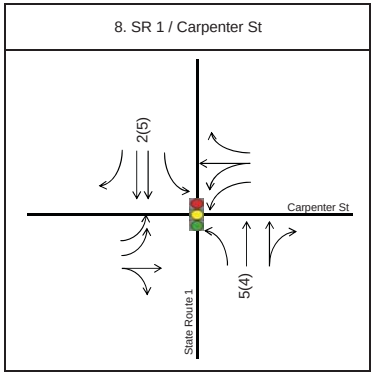


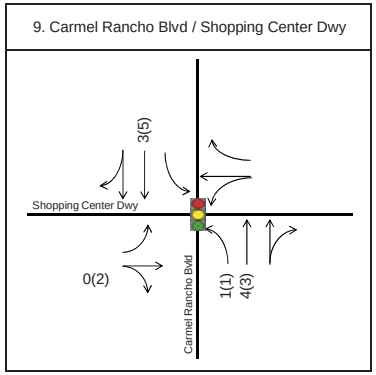


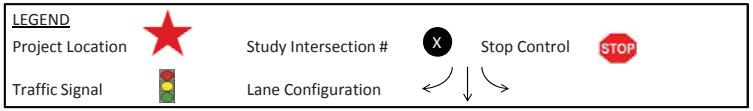












XX (YY) = AM (PM)

Source: Hatch Mott MacDonald, 2016

Project Trip Assignment AM & PM Peak Hour Volumes

Figure 4.14-4

The trips generated by the approved but not yet built or occupied projects were assigned to the road network and combined with the existing peak hour volumes to obtain Background traffic volumes. The Background peak hour volumes are shown in Figure 4.14-5.

b. Background Intersection Operations. Intersection levels of service are summarized in Table 4.14-8.

Table 4.14-8
Background Conditions Intersection Levels of Service

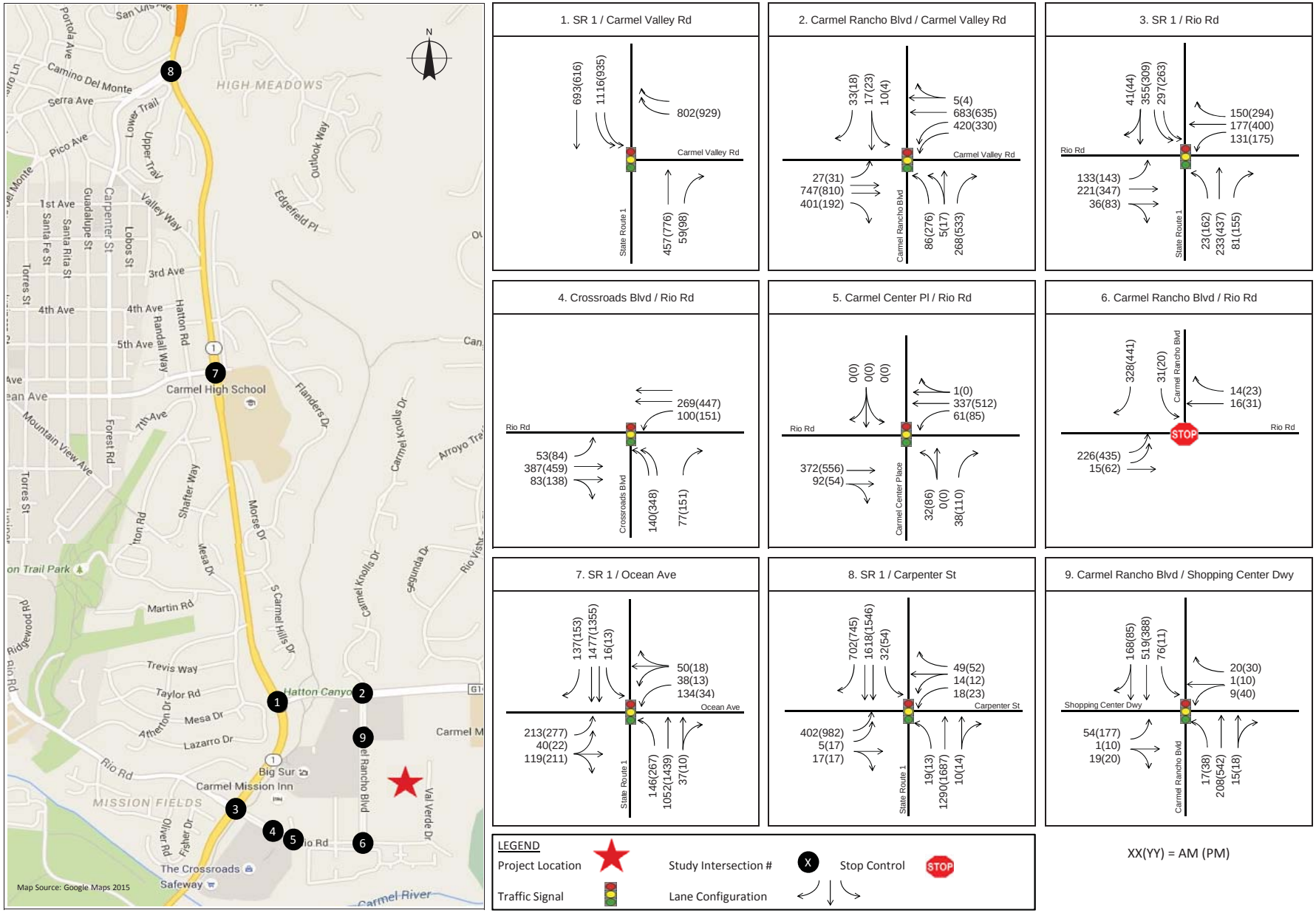
	Intersection	Control Type	Jurisdiction	LOS Standard	AM Peak Hour		PM Peak Hour	
					Delay (sec)	LOS	Delay (sec)	LOS
1	Highway 1/Carmel Valley Rd	Signal	Caltrans	C/D	11.9	B	21.0	B
2	Carmel Rancho Blvd/Carmel Valley Rd	Signal	CVMP	C	18.4	B	20.2	B
3	Highway 1/Rio Rd	Signal	Caltrans	C/D	22.8	C	38.6	**D**
4	Crossroads Blvd/Rio Rd	Signal	CVMP	C	10.2	B	12.5	B
5	Carmel Center Place/Rio Rd	Signal	CVMP	C	9.1	A	5.9	A
6	Carmel Rancho Blvd/Rio Rd	Two-Way Stop SB	CVMP	C	10.4	B	10.9	B
		EB			7.8	A	8.1	A
		WB			15.9	C	20.8	C
7	Highway 1/Ocean Ave	Signal	Caltrans	C/D	49.8	**D**	43.1	**D**
8	Highway 1/Carpenter St	Signal	Caltrans	C/D	25.0	C	52.4	**D**
9	Carmel Rancho Blvd/Shopping Center Dwy	Signal	CVMP	C	4.0	A	5.6	A

Source: Hatch Mott MacDonald, 2016.
Note: Bold indicates an exceedance of the applicable LOS standard.

Based on the LOS standards described in Section 4.14.7(a) (Methodology and Significance Thresholds), the following study intersections are projected to operate at unacceptable levels of service under Background conditions:

- Intersection #3 – Highway 1/Rio Road (LOS D – PM)
- Intersection #7 – Highway 1/Ocean Avenue (LOS D – AM & PM)
- Intersection #8 – Highway 1/Carpenter Street (LOS D – PM)

c. Background Road Segment Operations. Road segment levels of service are summarized in Tables 4.14-8 through 4.14-10. LOS for study segments #1 through #4 are referenced from the worst-case levels of service reported in the *Rancho Cañada Draft Transportation Impact Study* (CCTC, January 2016).



Source: Hatch Mott MacDonald, 2016

Background Conditions AM & PM Peak Hour Volumes

Figure 4.14-5

Table 4.14-9
Background Conditions Arterial Levels of Service

Seg #	Road Segment	AM Peak Hour		PM Peak Hour	
		Speed	LOS	Speed	LOS
Northbound Carmel Rancho Blvd					
12	Rio Rd to Shopping Center Dwy	27.3	A	24.7	B
11	From Shopping Center Dwy to Carmel Valley Rd	9.5	**D**	8.6	**E**
Southbound Carmel Rancho Blvd					
11	Carmel Valley Rd to Shopping Center Dwy	18.2	C	16.7	C
12	Shopping Center Dwy to Rio Rd	22.8	B	22.5	B
Eastbound Rio Rd					
5	Atherton Dr to Highway 1	17.3	C	17.3	C
13	Highway 1 to Crossroads Blvd	12.6	**D**	11.7	**D**
14	Crossroads Blvd to Carmel Center Pl	12.1	**D**	10.9	**D**
15	Carmel Center Pl to Carmel Rancho Blvd	16.0	C	17.1	C
Westbound Rio Rd					
15	Carmel Rancho Blvd to Carmel Center Pl	20.3	B	19.6	B
14	Carmel Center Pl to Crossroads Blvd	9.6	**D**	8.4	**E**
13	Crossroads Blvd to Highway 1	7.3	**E**	7.2	**E**
5	Highway 1 to Atherton Dr	23.5	B	23.5	B
Northbound Highway 1					
1	Ocean Ave to Carpenter St	-	C	-	**D**
2	Carmel Valley Rd to Ocean Ave	-	**F**	-	C
3	Rio Rd to Carmel Valley Rd	-	**F**	-	**F**
4	Ribera Rd to Rio Rd	-	B	-	B
Southbound Highway 1					
1	Carpenter St to Ocean Ave	-	**D**	-	C
2	Ocean Ave to Carmel Valley Rd	-	C	-	C
3	Carmel Valley Rd to Rio Rd	-	C	-	**E**
4	Rio Rd to Ribera Rd	-	B	-	B

Source: Hatch Mott MacDonald, 2016. Highway 1 road segment LOS are referenced from CCTC, 2015.
Note: Bold indicates an exceedance of the applicable LOS standard.

Table 4.14-10
Background Conditions Road Segments 6 and 7 Levels of Service

Seg #	Road Segment	CVMP ADT Threshold	ADT	AM Peak Hour			PM Peak Hour		
				2-Way Volume	PTSF	LOS	2-Way Volume	PTSF	LOS
Carmel Valley Rd									
6	Robinson Canyon Rd to Schulte Rd	15,499	15,847	1,165	86.2%	**E**	1,429	86.5%	**E**
7	Schulte Rd to Rancho San Carlos Rd	16,340	17,865	1,305	89.6%	**E**	1,610	90.0%	**E**

Source: Hatch Mott MacDonald, 2016.
Note: Bold indicates an exceedance of the applicable LOS standard.

Table 4.14-11
Background Conditions Road Segments 8 - 10 Levels of Service

Seg #	Road Segment	CVMP ADT Threshold	ADT	Direction	AM Peak Hour				PM Peak Hour			
					Volume (veh/hr)	Flow Rate (pcphpl)	Density (pc/mi/ln)	LOS	Volume (veh/hr)	Flow Rate (pcphpl)	Density (pc/mi/ln)	LOS
Carmel Valley Rd												
8	Rancho San Carlos Rd to Rio Rd	48,487	21,046	EB	625	340	6.2	A	1,020	594	10.8	A
				WB	915	545	9.9	A	834	454	8.3	A
9	Rio Rd to Carmel Rancho Blvd	51,401	26,319	EB	779	433	7.9	A	1,223	673	12.2	B
				WB	1,090	657	11.9	B	1,045	563	10.2	A
10	Carmel Rancho Blvd to SrR1	27,839	23,606	EB	1,006	548	10.0	A	945	494	9.0	A
				WB	860	512	9.3	A	1,039	572	10.4	A

Source: Hatch Mott MacDonald, 2016.
Note: Bold indicates an exceedance of the applicable LOS standard.

Under Background conditions, the ADTs on Carmel Valley Road study segments #6 and #7 are projected to exceed the CVMP ADT thresholds.

Based on the LOS standards described in Section 4.14.7(a) (Methodology and Significance Thresholds), the following road segments are projected to operate at unacceptable levels of service under Background conditions:

- Segment #1 – Highway 1 between Carpenter Street and Ocean Avenue
- Segment #2 – Highway 1 between Ocean Avenue and Carmel Valley Road
- Segment #3 – Highway 1 between Carmel Valley Road and Rio Road
- Segment #6 – Carmel Valley Road between Robinson Canyon Rd and Schulte Road
- Segment #7 – Carmel Valley Road between Schulte Road and Rancho San Carlos Road
- Segment #11 – Carmel Rancho Boulevard between Carmel Valley Road and Shopping Center Driveway
- Segment #13 – Rio Road between Highway 1 and Crossroads Boulevard
- Segment #14 – Rio Road between Crossroads Boulevard and Carmel Center Place

4.14.6 Cumulative Base Conditions

This section describes the analysis and results for 2035 Cumulative conditions.

a. Cumulative Roadway Network. The Transportation Agency for Monterey County (TAMC) and its member jurisdictions have adopted a countywide, regional impact fee to cover the costs for studies and the construction of many improvements throughout Monterey County. This impact fee, which went into effect on August 27, 2008, is applied to all new development within Monterey County.

The TAMC Regional Transportation Plan (RTP) includes a list of projects to improve traffic operations within the project study area. These improvements include:

1. Add a second northbound through lane on Highway 1 between Rio Road and Carmel Valley Road
2. Highway 1/Rio Road Intersection:
    a. Convert the northbound right-turn lane to a shared through/right-turn lane
    b. Add a second westbound right-turn lane
    c. Add an exclusive southbound right-turn lane
3. Highway 1/Carmel Valley Road Intersection:
    a. Convert the northbound right-turn lane to a shared through/right-turn lane

The construction of these improvements is dependent on State Transportation Improvement Program (STIP) funding, which is not guaranteed at this time. As a result, these improvements are not assumed to be in place under Cumulative traffic conditions.

b. 2035 Cumulative Traffic Volume Forecasts. The Cumulative conditions analysis is based upon the 2035 traffic volume forecasts from the 2014 AMBAG Regional Traffic Demand Model (RTDM) as well as a list of pending but not yet approved projects located within Carmel

Valley. Traffic increases due to the list of pending projects were given precedence over the RTDM forecasts in the vicinity of the project as they are local in nature, result in higher volume forecasts than the RTDM, and provide a more conservative estimate of future traffic volumes. The RTDM forecasts were used in areas where the addition of traffic from pending projects resulted in lower volumes than the RTDM forecasts, again providing a more conservative analysis.

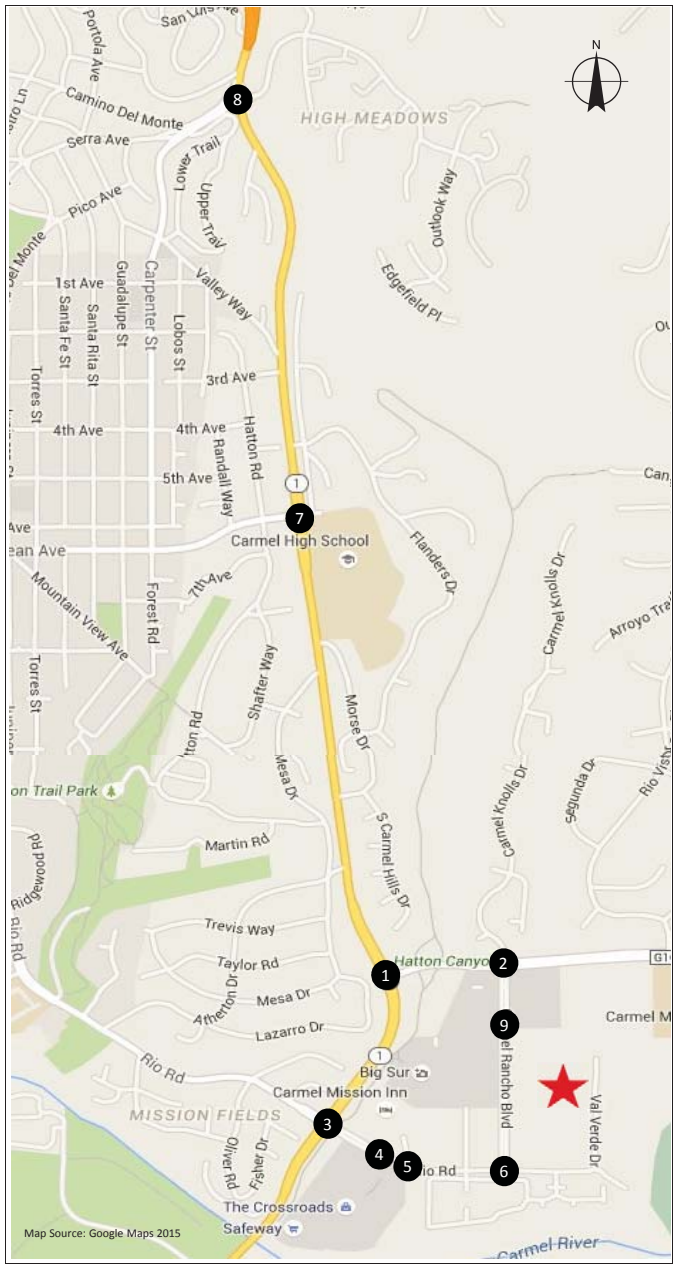
AM and PM peak hour traffic generated by pending projects was estimated based on trip generation rates within the Institute of Transportation Engineers' *Trip Generation* handbook, 9th Edition, 2012. The list of pending projects is provided in Appendix I to the TIA with a trip generation estimate for each project. The location of each pending project is provided in Appendix J to the TIA. The AMBAG 2014 and 2035 daily traffic model plots for the study area are provided in Appendix K to the TIA. Cumulative conditions AM and PM peak hour traffic volumes are included in Figure 4.14-6.

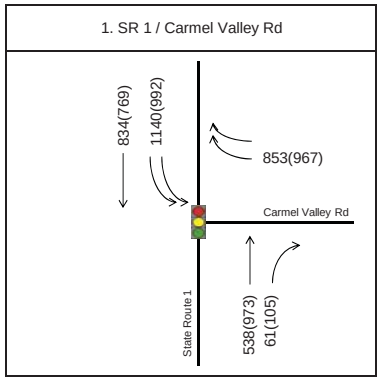
c. Cumulative Intersection Operations. Intersection levels of service are summarized in Table 4.14-12.

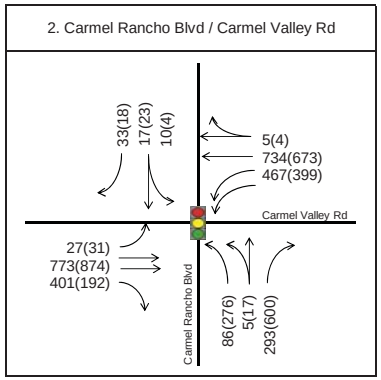
Table 4.14-12
Cumulative Conditions Intersection Levels of Service

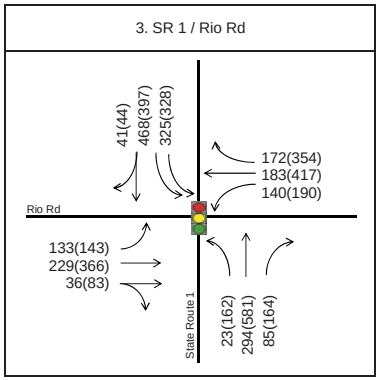
	Intersection	Control Type	Jurisdiction	LOS Standard	AM Peak Hour		PM Peak Hour	
					Delay (sec)	LOS	Delay (sec)	LOS
1	Highway 1/Carmel Valley Rd	Signal	Caltrans	C/D	14.1	B	43.5	**D**
2	Carmel Rancho Blvd/Carmel Valley Rd	Signal	CVMP	C	22.0	C	22.6	C
3	Highway 1/Rio Rd	Signal	Caltrans	C/D	26.7	C	54.0	**D**
4	Crossroads Blvd/Rio Rd	Signal	CVMP	C	20.2	C	32.9	C
5	Carmel Center Place/Rio Rd	Signal	CVMP	C	6.1	A	7.8	A
6	Carmel Rancho Blvd/Rio Rd	Two-Way Stop SB	CVMP	C	10.9	B	11.7	B
		EB			7.8	A	8.3	A
		WB			17.7	C	23.5	C
7	Highway 1/Ocean Ave	Signal	Caltrans	C/D	71.4	**E**	67.5	**E**
8	Highway 1/Carpenter St	Signal	Caltrans	C/D	32.3	C	77.2	**E**
9	Carmel Rancho Blvd/Shopping Center Dwy	Signal	CVMP	C	4.0	A	5.8	A

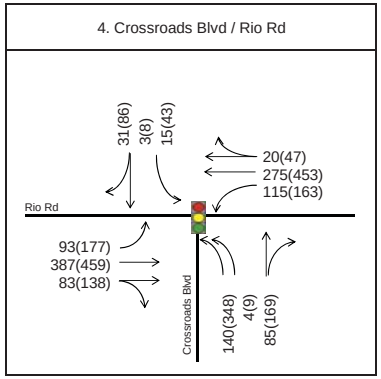
Source: Hatch Mott MacDonald, 2016.
Note: Bold indicates an exceedance of the applicable LOS standard.

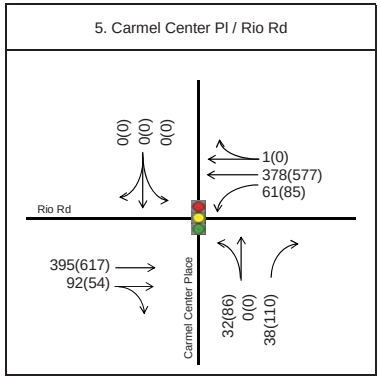


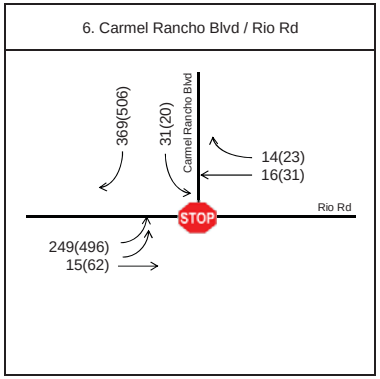


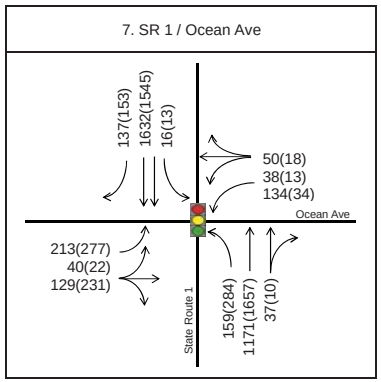


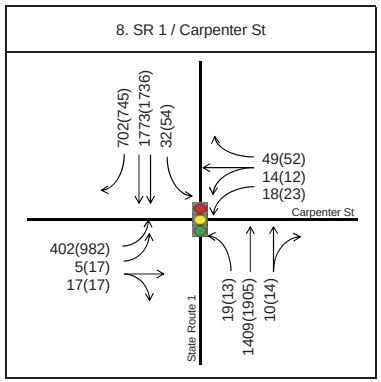


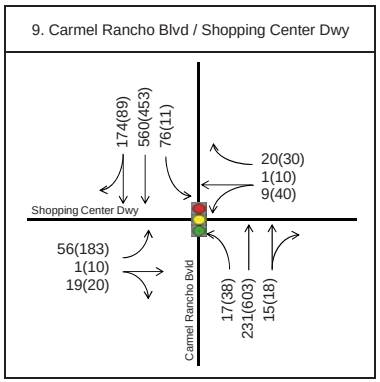












XX(YY) = AM (PM)

Source: Hatch Mott MacDonald, 2016

Cumulative Conditions AM & PM Peak Hour Volumes

Figure 4.14-6

Based on the LOS standards described in Section 4.14.7(a) (Methodology and Significance Thresholds), the following study intersections are projected to operate at unacceptable levels of service under Cumulative conditions:

- Intersection #1 – Highway 1/Carmel Valley Road (LOS D – PM)
- Intersection #3 – Highway 1/Rio Road (LOS D – PM)
- Intersection #7 – Highway 1/Ocean Avenue (LOS E – AM & PM)
- Intersection #8 – Highway 1/Carpenter Street (LOS E – PM)

d. Cumulative Road Segment Operations. Road segment levels of service are summarized in Tables 4.14-13 through 4.14-15. Levels of service for study segments #1 through #4 are referenced from the worst-case levels of service reported in the *Rancho Cañada Draft Transportation Impact Study* prepared by CCTC (January 2016).

Table 4.14-13
Cumulative Conditions Arterial Levels of Service

Seg #	Road Segment	AM Peak Hour		PM Peak Hour	
		Speed	LOS	Speed	LOS
Northbound Carmel Rancho Blvd					
12	Rio Rd to Shopping Center Dwy	27.2	A	24.6	B
11	From Shopping Center Dwy to Carmel Valley Rd	9.1	**D**	8.3	**E**
Southbound Carmel Rancho Blvd					
11	Carmel Valley Rd to Shopping Center Dwy	18.1	C	16.4	C
12	Shopping Center Dwy to Rio Rd	22.5	B	22.1	B
Eastbound Rio Rd					
5	Atherton Dr to Highway 1	17.1	C	17.0	C
13	Highway 1 to Crossroads Blvd	10.9	**D**	9.2	**D**
14	Crossroads Blvd to Carmel Center Pl	8.9	**E**	7.8	**E**
15	Carmel Center Pl to Carmel Rancho Blvd	16.0	C	17.0	C
Westbound Rio Rd					
15	Carmel Rancho Blvd to Carmel Center Pl	20.2	B	19.6	B
14	Carmel Center Pl to Crossroads Blvd	6.8*	**F**	4.8*	**F**
13	Crossroads Blvd to Highway 1	7.2	**E**	6.9	**F**
5	Highway 1 to Atherton Dr	23.5	B	23.5	B
Northbound Highway 1					
1	Ocean Ave to Carpenter St	-	C	-	**D**
2	Carmel Valley Rd to Ocean Ave	-	**F**	-	C
3	Rio Rd to Carmel Valley Rd	-	**F**	-	**F**
4	Ribera Rd to Rio Rd	-	B	-	B
Southbound Highway 1					
1	Carpenter St to Ocean Ave	-	**D**	-	C
2	Ocean Ave to Carmel Valley Rd	-	C	-	C
3	Carmel Valley Rd to Rio Rd	-	C	-	**E**
4	Rio Rd to Ribera Rd	-	B	-	B

Source: Hatch Mott MacDonald, 2016. Highway 1 road segment LOS are referenced from CCTC, 2015.
Note: Bold indicates an exceedance of the applicable LOS standard.
** Traffic flow on this segment is controlled by closely spaced intersections that operate acceptably.*

Under Cumulative conditions, the ADTs on Carmel Valley Road study segments #6 and #7 are projected to exceed the CVMP ADT thresholds.

Based on the LOS described in Section 4.14.7(a) (Methodology and Significance Thresholds), the following study road segments are projected to operate at unacceptable levels of service under Cumulative conditions:

- Segment #1 – Highway 1 between Carpenter Street and Ocean Avenue
- Segment #2 – Highway 1 between Ocean Avenue and Carmel Valley Road
- Segment #3 – Highway 1 between Carmel Valley Road and Rio Road
- Segment #6 – Carmel Valley Road between Robinson Canyon Road and Schulte Road
- Segment #7 – Carmel Valley Road between Schulte Road and Rancho San Carlos Road
- Segment #11 – Carmel Rancho Boulevard between Carmel Valley Road and Shopping Center Driveway
- Segment #13 – Rio Road between Highway 1 and Crossroads Boulevard
- Segment #14 – Rio Road between Crossroads Boulevard and Carmel Center Place

Table 4.14-14
Cumulative Conditions Road Segments 6 and 7 Levels of Service

Seg #	Road Segment	CVMP ADT Threshold	ADT	AM Peak Hour			PM Peak Hour		
				2-Way Volume	PTSF	LOS	2-Way Volume	PTSF	LOS
Carmel Valley Rd									
6	Robinson Canyon Rd to Schulte Rd	15,499	17,107	1,242	87.7%	**E**	1,555	88.0%	**E**
7	Schulte Rd to Rancho San Carlos Rd	16,340	19,125	1,382	89.4%	**E**	1,736	90.7%	**E**

Source: Hatch Mott MacDonald, 2016.
Note: Bold indicates an exceedance of the applicable LOS standard.

Table 4.14-15
Background Conditions Road Segments 8 - 10 Levels of Service

Seg #	Road Segment	CVMP ADT Threshold	ADT	Direction	AM Peak Hour				PM Peak Hour			
					Volume (veh/hr)	Flow Rate (pcphpl)	Density (pc/mi/ln)	LOS	Volume (veh/hr)	Flow Rate (pcphpl)	Density (pc/mi/ln)	LOS
Carmel Valley Rd												
8	Rancho San Carlos Rd to Rio Rd	48,487	22,706	EB	670	365	6.6	A	1,099	640	11.6	B
				WB	963	573	10.4	A	921	502	901	A
9	Rio Rd to Carmel Rancho Blvd	51,401	28,699	EB	831	462	8.4	A	1,354	746	13.6	B
				WB	1,188	716	13.0	B	1,152	621	11.3	B
10	Carmel Rancho Blvd to SrR1	27,839	24,626	EB	1,032	562	10.2	A	1,009	527	9.5	A
				WB	911	542	9.9	A	1,077	593	10.8	A

Source: Hatch Mott MacDonald, 2016.
Note: Bold indicates an exceedance of the applicable LOS standard.

4.14.7 Impact Analysis

a. Methodology and Significance Thresholds. The study area covers the jurisdictions of the County of Monterey and Caltrans, and is within the Carmel Valley Master Plan area. Levels of service standards and analysis methodologies for each jurisdiction and/or planning area have been applied as follows:

Traffic Operation Evaluation Methodologies. Intersection and road segment traffic operations were evaluated based on the Level of Service (LOS) concept, and the LOS standard adopted by the jurisdiction within which the intersection is located. LOS is a quantitative description of an intersection's operation, ranging from LOS A to LOS F. Level of service "A" represents free flow un-congested traffic conditions. Level of service "F" represents highly congested traffic conditions with what is commonly considered unacceptable delay to vehicles at intersections. The intermediate levels of service represent incremental levels of congestion and delay between these two extremes. LOS descriptions for signalized intersections are included as Appendix A to the TIA. LOS descriptions for unsignalized intersections with two-way stop control are included as Appendix B to the TIA.

Intersection traffic operations were evaluated using the Synchro analysis software (Version 8) which is based on the *Highway Capacity Manual (HCM) 2010* methodologies for signalized and un-signalized intersections.

HCM 2000 methods were used in cases where the HCM 2010 methods do not allow the analysis of specific lane configurations or signal phasing.

Intersection operations are based upon the average vehicular delay at the intersection. The average delay is then correlated to a level of service. For two-way stop controlled intersections, the vehicle delay for side street traffic is analyzed. LOS for each side street movement is based on the distribution of gaps in the major street traffic stream and driver judgment in selecting gaps. Improvements are warranted when a side street approach reaches LOS F for two-way stop controlled intersections. When using the HCM 2010 and HCM 2000 methods for the analysis of signalized intersections, the overall intersection delay is used to determine LOS.

Per direction from Monterey County Department of Public Works staff, road segment operations for study segments #1 - #4 are referenced from the *Rancho Cañada Draft Transportation Impact Study* prepared by Central Coast Transportation Consulting (CCTC, January 2016). Study segments #1 - #4 are the northbound and southbound segments of Highway 1 between Carpenter Street and Ribera Road. These segments were analyzed by CCTC using National Cooperative Highway Research Program (NCHRP) Report 3-70; *Multi-Modal Level of Service for Urban Streets Methodology*.

Road segment operations for study segments #5 and #11 – #15 were evaluated using the Synchro software arterial analysis module which is based on HCM 2000 methodologies. The arterial LOS is based on the travel speed and Urban Street Class of the roadway as shown in Appendix C to the TIA.

Road segment operations for study segments on Carmel Valley Road (segments #6 – #10) were evaluated in accordance with the Carmel Valley Master Plan (CVMP) using Average Daily

Traffic (ADT) volumes and HCM 2010 methodologies. The HCM 2010 methods include the evaluation of multi-lane and two-lane highways.

The methodology for two-lane highways is based on the "percent time-spent-following" (PTSP), which is correlated to a level of service (HCM 2010 Exhibit 15-3). The HCM 2010 LOS methodology for multi-lane highways is based on vehicle density in passenger cars per mile per lane (pcpmpl). The density is correlated to a level of service (HCM 2010 Exhibit 14-4). HCM 2010 Exhibits 14-4 and 15-3 are provided in Appendix C to the TIA.

The 2010 CVMP also provides the ADT thresholds for segments of Carmel Valley Road, as shown in Table 4.14-16. These thresholds apply study segments #6 through #10.

Table 4.14-16
Carmel Valley Road ADT Thresholds

Segment	CVMP Threshold (ADT)
6. CVR between Robinson Canyon Rd & Schulte Rd	15,499
7. CVR between Schulte Rd & Rancho San Carlos Rd	16,340
8. CVR between Rancho San Carlos Rd & Rio Rd	48,487
9. CVR between Rio Rd & Carmel Rancho Blvd	51,401
10. CVR between Carmel Rancho Blvd & Highway 1	27,839

Source: Hatch Mott MacDonald, 2016.

Monterey County Level of Service Standards. The Monterey County General Plan has established LOS D as the minimum acceptable level of service for signalized intersections and road segments. For un-signalized intersections LOS E is considered the maximum acceptable level of service (based on the delay at the worst approach for two-way stop controlled intersections and the average delay at all-way stop and roundabout controlled intersections). All of the intersections in this study fall under the jurisdiction of Caltrans or the Carmel Valley Master Plan. Roadway segment #5 falls under the jurisdiction of Monterey County with an LOS D standard.

Carmel Valley Master Plan Level of Service Standards. With the exception of some road segments along Carmel Valley Road, LOS C has been established as the minimum acceptable level of service for roadways and intersections within Carmel Valley. Per CVMP Policy 2.18, LOS D has been established as the minimum acceptable level of service for several segments along Carmel Valley Road.

Study intersections that fall under the jurisdiction of the Carmel Valley Master Plan with an LOS C standard include intersections #2, #4, #5, #6 and #9. Roadway segments that fall under the jurisdiction of the Carmel Valley Master Plan with an LOS D standard include segments #6 and #7, while segments #8, #9, #10, #11, #12, #13, #14 and #15 have an LOS C standard.

Significance Thresholds. According to the adopted Appendix G of the State *CEQA Guidelines*, impacts related to transportation and circulation from the proposed project would be significant if the project would:

1) *Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit;*
2) *Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways;*
3) *Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks;*
4) *Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g. farm equipment);*
5) *Result in inadequate emergency access; and/or*
6) *Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?*

As explained more fully in Section 4.16, *Effects Found Not to be Significant*, implementation of the proposed project would not result in a change in air traffic patterns, would not substantially increase hazards due to a design feature or incompatible use, would not result in inadequate emergency access, and would not conflict with adopted policies, plans, or programs regarding alternative transportation. Therefore, no further discussion of thresholds 3 through 3 is included in this section. Further discussion of these issues can be found in Section 4.15, *Effects Found Not to Be Significant*. Thresholds 1 and 2 are discussed below.

In accordance with CEQA, specific impact criteria have been applied to the study intersections and road segments to determine if the project specific increase in traffic is substantial in relation to the existing traffic load and capacity of the street system.

The study area falls within multiple jurisdictions and planning areas, as described in Section 1.3. The impact criteria for the relevant jurisdictions and planning areas are listed below and have been applied to the analysis results.

Monterey County Impact Criteria. An impact at a signalized study intersection is defined to occur under the following conditions:

- An impact would occur if an intersection operating at LOS A, B, C, or D degrades by one or more letter grades to LOS E or F. For intersections already operating at LOS E, an impact would occur if operations degrade to LOS F. For intersections already operating at LOS F, the addition of any project traffic to the facility is considered an impact.

An impact at an unsignalized study intersection is defined to occur under the following conditions:

- An impact would occur if an all-way stop controlled or roundabout controlled intersection, based on the average delay, operates at LOS F or any traffic signal warrant is met.
- An impact would occur if a two-way stop controlled intersection, based on the worst approach delay, operates at LOS F or any traffic signal warrant is met.

An impact at a study road segment is defined to occur under the following conditions:

- An impact would occur if a roadway segment operating at LOS A through LOS E degrades to a lower level of service E or F. If a segment is already operating at LOS F any increase during the peak hour (one vehicle) is considered an impact.

Carmel Valley Master Plan Impact Criteria. The following impact criteria are based on the Monterey County General Plans' Carmel Valley Master Plan (CV 2.17(f)) and apply to study intersections 2, 4, 5, 6 and 9:

An impact at a signalized study intersection is defined to occur under the following conditions:

- An impact would occur if an intersection operating at LOS A, B or C degrades by one or more letter grades to LOS D, E or F. If an intersection is already operating at LOS D or E, an impact would occur the LOS degrades by one or more letter grades to LOS E or F. If an intersection is already operating at LOS F, the addition of any project traffic to the facility is considered an impact.

An impact at an unsignalized study intersection is defined to occur under the following conditions:

- An impact would occur if an all-way stop controlled or roundabout controlled intersection, based on the average delay, operates at LOS F or any traffic signal warrant is met.
- An impact would occur if a two-way stop controlled intersection, based on the worst approach delay, operates at LOS F or any traffic signal warrant is met.

An impact on a study road segments #8, #9, #10, #11, #12, #13, #14, #15 would occur if operations degrade from LOS C or better to LOS D, E or F; or if operations degrade on study road segments #6 or #7 from LOS D or better to LOS E or F; or if project traffic worsens the LOS of a segment operating at LOS E by one letter grade to LOS F; or if project traffic is added to a segment operating at LOS F; or if the CVMP ADT threshold is exceeded.

Caltrans Impact Criteria. Caltrans perceives an impact when there is any degradation in the performance measure below the cusp of C/D. If a facility is currently operating at or below LOS D, then any trips added represent a potential impact, and the performance measure should be brought back to predevelopment conditions. While a single trip added to a degraded facility is not usually reflected in the performance measure, Caltrans reserves the ability to consider a single trip as an impact.

SB 743. On September 27, 2013, Governor Brown signed Senate Bill (SB) 743, which creates a process to change the way that transportation impacts are analyzed under CEQA. SB 743 supports AB 32, the California Global Warming Solutions Act of 2006, and SB 375, the Sustainable Communities and Climate Protection Act of 2008, which call for substantial reductions in greenhouse gas (GHG) emissions. SB 743 mandates a change in the way that public agencies evaluate transportation impacts of projects under CEQA.

Under the new CEQA Guidelines, aspects of project location and design that influence travel choices, and thereby improve or degrade air quality, safety, and health, must be considered. The new CEQA Guidelines will eliminate the use of automobile delay, including LOS, in evaluating transportation impacts and replace it with Vehicle Miles Traveled (VMT), based on a goal of reducing statewide GHG emissions by 15% by the year 2020.

The new CEQA Guidelines will measure whether a project contributes to various state goals, such as reducing GHG emissions, developing multimodal transportation, preserving open spaces, and promoting diverse land uses and infill development. Projects that are shown to decrease vehicle miles traveled — for example, bike lanes or pedestrian paths, or a grocery store that allows local residents to travel shorter distances to shop — may be automatically considered to have a less than significant impact under CEQA. Under the new CEQA Guidelines, projects may be able to mitigate transportation impacts by funding better transit, creating better access to transit, designing more walkable communities, or implementing other improvements that increase travel choices.

The cities of San Francisco and Pasadena have already modified their local environmental review process by removing automobile delay (i.e., LOS) and replacing it with VMT when determining significant traffic impacts on the environment pursuant to CEQA. The statewide revisions to the CEQA Guidelines are expected to be completed in mid-2017, and the implementation of the revised guidelines may be phased in over the course of two years. Thus, SB 743 and the associated revised CEQA Guidelines do not apply to the proposed project.

Funding for Transportation Improvements.

Carmel Valley Traffic Impact Improvement Program. The Carmel Valley Traffic Improvement Program (CVTIP) includes a list of projects to relieve congestion and improve traffic operations on Carmel Valley Road. The CVTIP collects fees from new developments to contribute to these improvements. The traffic fees apply to projects within Carmel Valley and to projects in the Greater Carmel Valley Area that will add traffic to Carmel Valley Road. Per the Carmel Valley Traffic Improvement Program EIR, the fee amounts are updated on an annual basis.

TAMC Fee. The Transportation Agency for Monterey County (TAMC) and its member jurisdictions have adopted a county-wide, regional impact fee to cover the costs for studies and construction of many improvements throughout Monterey County. This impact fee, which went into effect on August 27, 2008, is applied to all new development within Monterey County. The governing document for the fee is the Regional Impact Fee Nexus Study Update (March 26, 2008) prepared by Kimley-Horn Associates, Inc. The Regional Impact Fee Nexus Study Update was updated again in 2013.

Monterey County Traffic Impact Fee. The 2010 Monterey County General Plan, which was adopted October 26, 2010, includes the following policies:

Policy C-1.8 Development proposed in cities and adjacent counties shall be carefully reviewed to assess the proposed development's impact on the County's circulation system. The County, in consultation with TAMC and Monterey County cities shall, within 18 months of adoption of the General Plan, develop a County Traffic Impact fee that addresses Tier 2 impacts of development in cities and unincorporated areas. From the time of adoption of the General Plan until the time of adoption of a County Traffic Impact Fee, the County shall impose an ad hoc fee on its applicants based upon a fair share traffic impact fee study.

Policy C-1.9 All available public and private sources shall be used for the funding of road and highway development, improvement and maintenance.

Policy C-1.10 The County, in coordination with TAMC and other affected agencies, shall continue efforts to improve traffic congestion at critical locations.

Policy C-1.11 In addition to the County Traffic Impact Fee established in Policy C-1.8, the County shall require new development to pay a Regional Traffic Impact Fee developed collaboratively between TAMC, the County, and other local and state agencies to ensure a funding mechanism for regional transportation improvements mitigating Traffic Tier 3 impacts.

b. Project Impacts and Mitigation Measures.

Threshold 1:	*Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit*
Threshold 2:	*Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways*

Impact T-1 **The proposed project would result in potentially significant impacts to three study intersections and two study road segments under Existing plus Project conditions. Planned improvements and required mitigation would potentially eliminate some of these impacts; however, funding and timing of these improvements cannot be guaranteed. In addition, mitigation for one intersection and two road segments is not feasible. Therefore, project impacts under Existing plus Project conditions would be Class I, *significant and unavoidable*.**

Intersection Operations. The proposed project traffic assignments were added to the existing traffic volumes to obtain Existing plus Project traffic volumes. Existing plus Project traffic volumes for the AM and PM peak hours are presented in Figure 4.14-7. Intersection levels of service are summarized in Table 4.14-17.

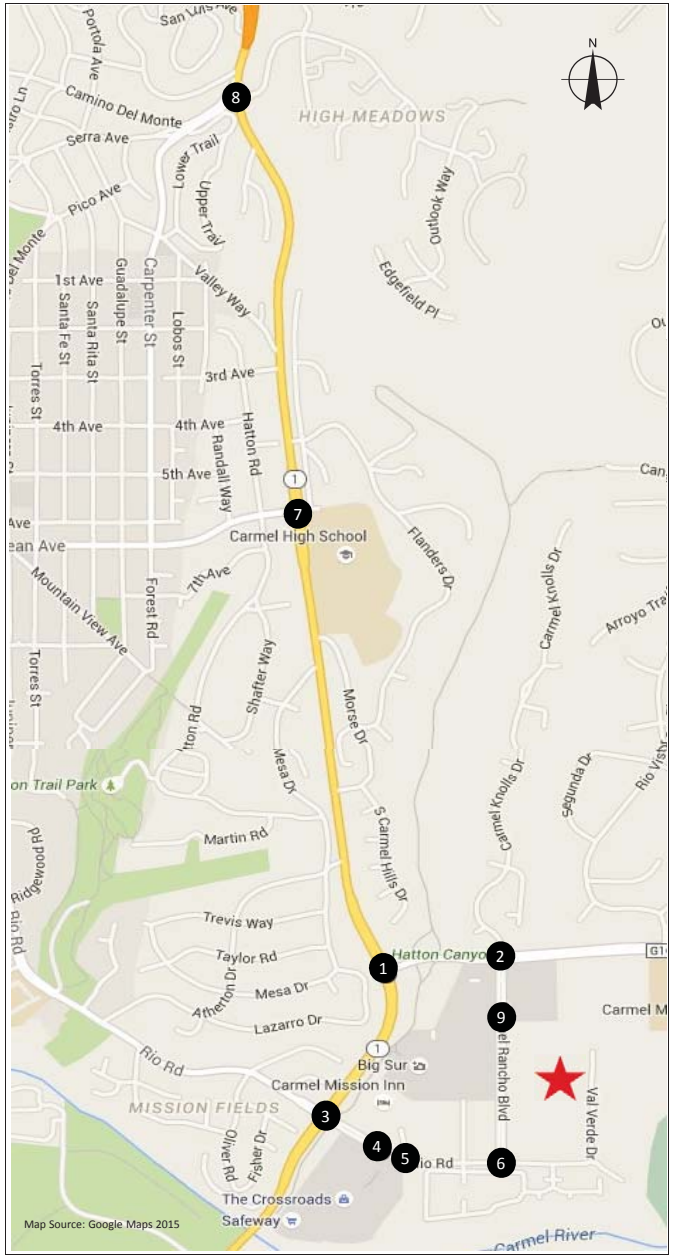
Table 4.14-17
Existing plus Project Conditions Intersection Levels of Service

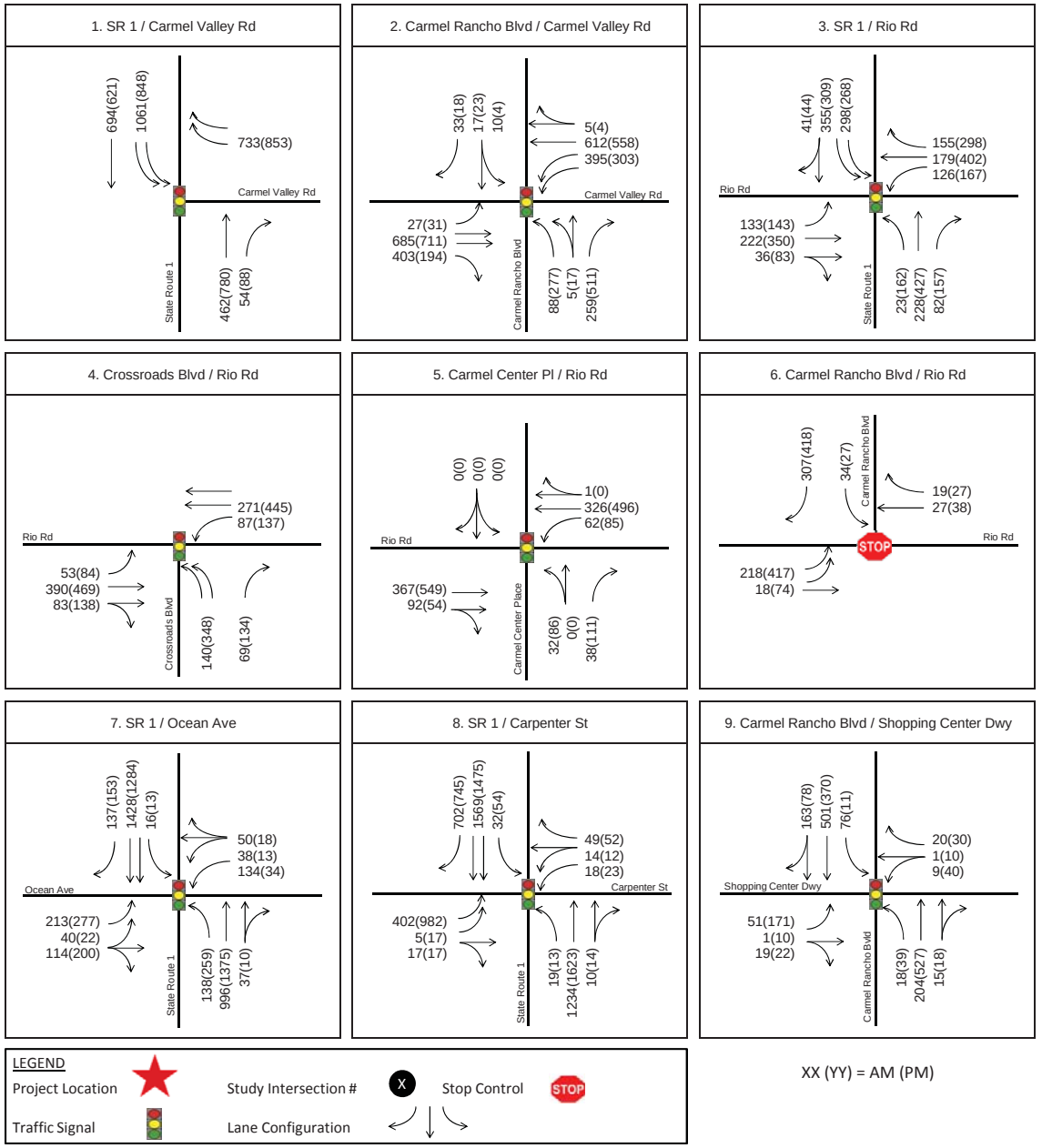
	Intersection	Control Type	Jurisdiction	LOS Standard	AM Peak Hour		PM Peak Hour	
					Delay (sec)	LOS	Delay (sec)	LOS
1	Highway 1/Carmel Valley Rd	Signal	Caltrans	C/D	11.4	B	18.2	B
2	Carmel Rancho Blvd/Carmel Valley Rd	Signal	CVMP	C	17.0	B	19.4	B
3	Highway 1/Rio Rd	Signal	Caltrans	C/D	22.8	C	38.0	**D**
4	Crossroads Blvd/Rio Rd	Signal	CVMP	C	9.9	A	11.9	B
5	Carmel Center Place/Rio Rd	Signal	CVMP	C	9.3	A	6.0	A
6	Carmel Rancho Blvd/Rio Rd	Two-Way Stop SB	CVMP	C	10.2	B	10.7	B
		EB			7.7	A	8.1	A
		WB			15.7	C	19.5	C
7	Highway 1/Ocean Ave	Signal	Caltrans	C/D	44.1	**D**	37.5	**D**
8	Highway 1/Carpenter St	Signal	Caltrans	C/D	23.8	C	47.4	**D**
9	Carmel Rancho Blvd/Shopping Center Dwy	Signal	CVMP	C	4.0	A	5.6	A

Source: Hatch Mott MacDonald, 2016.
Note: Bold indicates an exceedance of the applicable LOS standard.

Based on Table 4.14-17 and the LOS standards described in Section 4.14.7(a) (Methodology and Significance Thresholds), the following intersections are projected to operate at unacceptable levels of service under Existing plus Project conditions:

- *Intersection #3 – Highway 1/Rio Road (LOS D – PM).* This intersection is under Caltrans jurisdiction. The proposed project would increase delay at this intersection, which already operates at an unacceptable LOS D during the PM peak hour. Based on the Caltrans impact criteria, the proposed project would have an impact at this intersection during the PM peak hour and mitigation is required.
- *Intersection #7 – Highway 1/Ocean Avenue (LOS D – AM & PM).* This intersection is under Caltrans jurisdiction. The proposed project would increase delay at this intersection, which already operates at an unacceptable LOS D during the AM and PM peak hours. Based on the Caltrans impact criteria, the proposed project would have an impact at this intersection during the AM and PM peak hours and mitigation is required.
- *Intersection #8 – Highway 1/Carpenter Street (LOS D – PM).* This intersection is under Caltrans jurisdiction. The proposed project would increase delay at this intersection,





Source: Hatch Mott MacDonald, 2016

Existing plus Project Conditions AM & PM Peak Hour Volumes

Figure 4.14-7

which already operates at an unacceptable LOS D during the PM peak hour. Based on the Caltrans impact criteria, the proposed project would have an impact at this intersection during the PM peak hour and mitigation is required.

Road Segment Operations. Road segment levels of service are summarized in Tables 4.14-18 through 4.14-20.

Table 4.14-18
Existing plus Project Conditions Arterial Levels of Service

Seg #	Road Segment	AM Peak Hour		PM Peak Hour	
		Speed	LOS	Speed	LOS
Northbound Carmel Rancho Blvd					
12	Rio Rd to Shopping Center Dwy	27.3	A	24.9	B
11	From Shopping Center Dwy to Carmel Valley Rd	9.5	**D**	8.9	**E**
Southbound Carmel Rancho Blvd					
11	Carmel Valley Rd to Shopping Center Dwy	18.3	C	16.8	C
12	Shopping Center Dwy to Rio Rd	22.9	B	22.6	B
Eastbound Rio Rd					
5	Atherton Dr to Highway 1	17.3	C	17.3	C
13	Highway 1 to Crossroads Blvd	12.9	**D**	11.7	**D**
14	Crossroads Blvd to Carmel Center Pl	12.2	**D**	11.0	**D**
15	Carmel Center Pl to Carmel Rancho Blvd	16.1	C	17.1	C
Westbound Rio Rd					
15	Carmel Rancho Blvd to Carmel Center Pl	20.3	B	19.6	B
14	Carmel Center Pl to Crossroads Blvd	9.6	**D**	8.3	**E**
13	Crossroads Blvd to Highway 1	7.3	**E**	7.2	**E**
5	Highway 1 to Atherton Dr	23.5	B	23.5	B
Northbound Highway 1					
1	Ocean Ave to Carpenter St	-	C	-	**D**
2	Carmel Valley Rd to Ocean Ave	-	C	-	C
3	Rio Rd to Carmel Valley Rd	-	**F**	-	**F**
4	Ribera Rd to Rio Rd	-	B	-	B
Southbound Highway 1					
1	Carpenter St to Ocean Ave	-	**D**	-	C
2	Ocean Ave to Carmel Valley Rd	-	C	-	C
3	Carmel Valley Rd to Rio Rd	-	C	-	**E**
4	Rio Rd to Ribera Rd	-	B	-	B

Source: Hatch Mott MacDonald, 2016. Highway 1 road segment LOS are referenced from CCTC, 2015.
Note: Bold indicates an exceedance of the applicable LOS standard.

Table 4.14-19
Existing plus Project Conditions Road Segments 6 and 7 Levels of Service

Seg #	Road Segment	CVMP ADT Threshold	ADT	AM Peak Hour			PM Peak Hour		
				2-Way Volume	PTSF	LOS	2-Way Volume	PTSF	LOS
Carmel Valley Rd									
6	Robinson Canyon Rd to Schulte Rd	15,499	14,654	1,073	85.2%	**E**	1,298	85.0%	**E**
7	Schulte Rd to Rancho San Carlos Rd	16,340	16,017	1,160	87.0%	**E**	1,407	87.5%	**E**

Source: Hatch Mott MacDonald, 2016.
Note: Bold indicates an exceedance of the applicable LOS standard.

Table 4.14-20
Existing plus Project Conditions Road Segments 8 - 10 Levels of Service

Seg #	Road Segment	CVMP ADT Threshold	ADT	Direction	AM Peak Hour				PM Peak Hour			
					Volume (veh/hr)	Flow Rate (pcphpl)	Density (pc/mi/ln)	LOS	Volume (veh/hr)	Flow Rate (pcphpl)	Density (pc/mi/ln)	LOS
Carmel Valley Rd												
8	Rancho San Carlos Rd to Rio Rd	48,487	19,025	EB	549	299	5.4	A	902	524	9.5	A
				WB	816	486	8.8	A	730	398	7.2	A
9	Rio Rd to Carmel Rancho Blvd	51,401	24,271	EB	708	395	7.1	A	1,102	607	11.0	B
				WB	994	599	10.9	A	941	507	9.2	A
10	Carmel Rancho Blvd to Highway 1	27,839	22,137	EB	946	515	9.4	A	848	443	8.1	A
				WB	790	470	8.5	A	965	531	9.7	A

Source: Hatch Mott MacDonald, 2016.
Note: Bold indicates an exceedance of the applicable LOS standard.

LOS for segments #1 through #4, as shown in Table 4.14-17, are referenced from the Rancho Cañada Draft Transportation Impact Study (CCTC, January 2016). The LOS for these segments would remain the same under Existing and Existing plus 130-Unit Alternative conditions in the Rancho Cañada report. Since the proposed project includes fewer units (i.e., 31 vs 130 units), the Rancho Cañada report represents a conservative analysis for study segments #1 through #4.

As shown in Tables 4.14-19 and 4.14-20, the ADTs on the Carmel Valley Road study segments (#6 through #10) are projected to be below the CVMP ADT thresholds under Existing plus Project conditions.

Based on Tables 4.14-18 through 4.14-20 and the LOS standards described in Section 4.14.7(a) (Methodology and Significance Thresholds), the following road segments are projected to operate at unacceptable levels of service under Existing plus Project conditions:

- *Segment #1 – Highway 1 between Carpenter Street and Ocean Avenue*. This road segment is under Caltrans jurisdiction. The proposed project would add traffic to this segment, which already operates at an unacceptable LOS D in the southbound direction during the AM peak hour and LOS D in the northbound direction during the PM peak hour. Based on the Caltrans impact criteria, the project would have an impact on this road segment and mitigation is required.
- *Segment #3 – Highway 1 between Carmel Valley Road and Rio Road*. This road segment is under Caltrans jurisdiction. The proposed project would add traffic to this segment, which operates at an unacceptable LOS F in the northbound direction during the AM and PM peak hours and LOS E in the southbound direction during the PM peak hour. Based on the Caltrans impact criteria, the project would have an impact on this road segment and mitigation is required.
- *Segment #6 – Carmel Valley Road between Robinson Canyon Road and Schulte Road*. This road segment is under CVMP jurisdiction. The proposed project would add traffic to this segment, which operates at an unacceptable LOS E during the AM and PM peak hours. This segment is not projected to exceed the CVMP ADT threshold under Existing plus Project conditions because it would not worsen the LOS by one letter grade. Therefore, no mitigation is required.
- *Segment #7 – Carmel Valley Road between Schulte Road and Rancho San Carlos Road*. This road segment is under CVMP jurisdiction. The proposed project would add traffic to this segment, which operates at an unacceptable LOS E during the AM and PM peak hours. This segment is not projected to exceed the CVMP ADT threshold under Existing plus Project conditions because it would not worsen the LOS by one letter grade to LOS F. Therefore, no mitigation is required for this road segment.
- *Segment #11 – Carmel Rancho Boulevard between Carmel Valley Road and Shopping Center Driveway*. This road segment is under CVMP jurisdiction. The proposed project would add traffic to this segment, which operates at an unacceptable LOS D and LOS E in the northbound direction during the AM and PM peak hours. This segment is not projected to exceed the CVMP ADT threshold under Existing plus Project conditions because it would not worsen the LOS by one letter grade. Therefore, no mitigation is required.
- *Segment #13 – Rio Road between Highway 1 and Crossroads Boulevard*. This road segment is under CVMP jurisdiction. The proposed project would add traffic to this segment, which operates at an unacceptable LOS D eastbound and LOS E westbound during the

AM and PM peak hours. This segment is not projected to exceed the CVMP ADT threshold under Existing plus Project conditions because it would not worsen the LOS by one letter grade. Therefore, no mitigation is required.

- *Segment #14 – Rio Road between Crossroads Blvd and Carmel Center Place*. This road segment is under CVMP jurisdiction. The proposed project would add traffic to this segment, which operates at an unacceptable LOS D eastbound and LOS D and E westbound during the AM and PM peak hours. This segment is not projected to exceed the CVMP ADT threshold under Existing plus Project conditions because it would not worsen the LOS by one letter grade. Therefore, no mitigation is required.

Mitigation Measures. Based on the impact analysis in the TIA and summarized above, three intersections and two roadway segments require mitigation under Existing plus Project conditions. This includes intersections #3, #7, and #8, and road segments #1 and #3.

The TAMC Regional Transportation Plan (RTP) includes a list of projects to improve traffic operations within the project study area. Planned improvements include:

1. Add a second northbound through lane on Highway 1 between Rio Road and Carmel Valley Road
2. Highway 1/Rio Road Intersection:
    a. Convert the northbound right-turn lane to a shared through/right-turn lane
    b. Add a second westbound right-turn lane
    c. Add an exclusive southbound right-turn lane
3. Highway 1/Carmel Valley Road Intersection:
    a. Convert the northbound right-turn lane to a shared through/right-turn lane

The above planned improvements would eliminate the proposed project's impact to intersection #3 (Highway 1/Rio Road) and road segment #3 (Highway 1 between Carmel Valley Road and Rio Road) in the northbound direction.

Project-specific impacts to intersection #8 (Highway 1/Carpenter Street) and segment #1 (Highway 1 between Carpenter Street and Ocean Avenue) in the northbound direction could potentially be reduced with the addition of a northbound right-turn lane at Highway 1 and Carpenter Street. However, as intersection #8 and road segment #1 both operate deficiently without the project, the project applicant would be responsible for a fair share contribution only. As shown in Figure 4.11-4, the project's contribution to this intersection would be seven trips during the AM peak hour and nine trips during the PM peak hour, none of which would turn right from Highway 1 onto Carpenter Street. The improvement is not planned within the TAMC RTP or other regional document, and there is no funding established for this improvement. Thus, there is no mechanism into which the applicant could pay a fair share to ensure the improvement is constructed. Further, the improvement would be within Caltrans jurisdiction, and would therefore be beyond the control of the project applicant and/or the County of Monterey. For these reasons, this TIA-identified mitigation is considered infeasible and is not included herein. It should also be noted that, with such an improvement, LOS D operations would continue at intersection #8: a northbound right-turn lane would reduce delays to pre-project conditions, but would not improve operations to an acceptable LOS.

Significance After Mitigation. While the proposed project's impact to intersection #3 and road segment #3 in the northbound direction would be eliminated with planned improvements in the TAMC RTP, the construction of these planned improvements is dependent on State Transportation Improvement Program (STIP) funding, which is not guaranteed at this time. Participation in funding these improvements – as is required through payment of TAMC impact fees – would partially reduce impacts. However, because complete funding cannot be guaranteed and timing of the planned improvements cannot be assured, impacts would remain significant and unavoidable.

According to the TIA, there are no feasible improvements for intersection #7 (Highway 1/Ocean Avenue). As discussed above, there are also no feasible improvements for intersection #8 (Highway 1/Carpenter Street). Therefore, impacts to intersections #7 and #8 would remain significant and unavoidable.

There are no feasible improvements for road segment #1. Widening Highway 1 would eliminate the project's impacts to road segment #3 in the southbound direction; however, this is not feasible. Therefore, impacts to these segments in the southbound direction would remain significant and unavoidable.

To summarize, project impacts to the following intersections and road segments would remain significant and unavoidable under the Existing plus Project conditions:

- Intersection #3
- Intersection #7
- Intersection #8
- Road segment #1 (northbound and southbound)
- Road segment #3 (northbound and southbound)

Threshold 1:	*Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit.*
Threshold 2:	*Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways.*

Impact T-2 **Implementation of the proposed project would result in potentially significant impacts to three study intersections and five study road segments under Background plus Project conditions. Planned improvements and required mitigation would potentially eliminate some of these impacts; however, funding and timing of these improvements cannot be guaranteed. In addition, mitigation for one intersection and five road segments is not feasible. Therefore, project impacts under**

Background plus Project conditions would be Class I, *significant and unavoidable.*

Intersection Operations. The proposed project traffic assignments were added to the Background traffic volumes to obtain Background plus Project traffic volumes. Background plus Project traffic volumes for the AM and PM peak hours are presented in Figure 4.14-8. Intersection levels of service are summarized in Table 4.14-21.

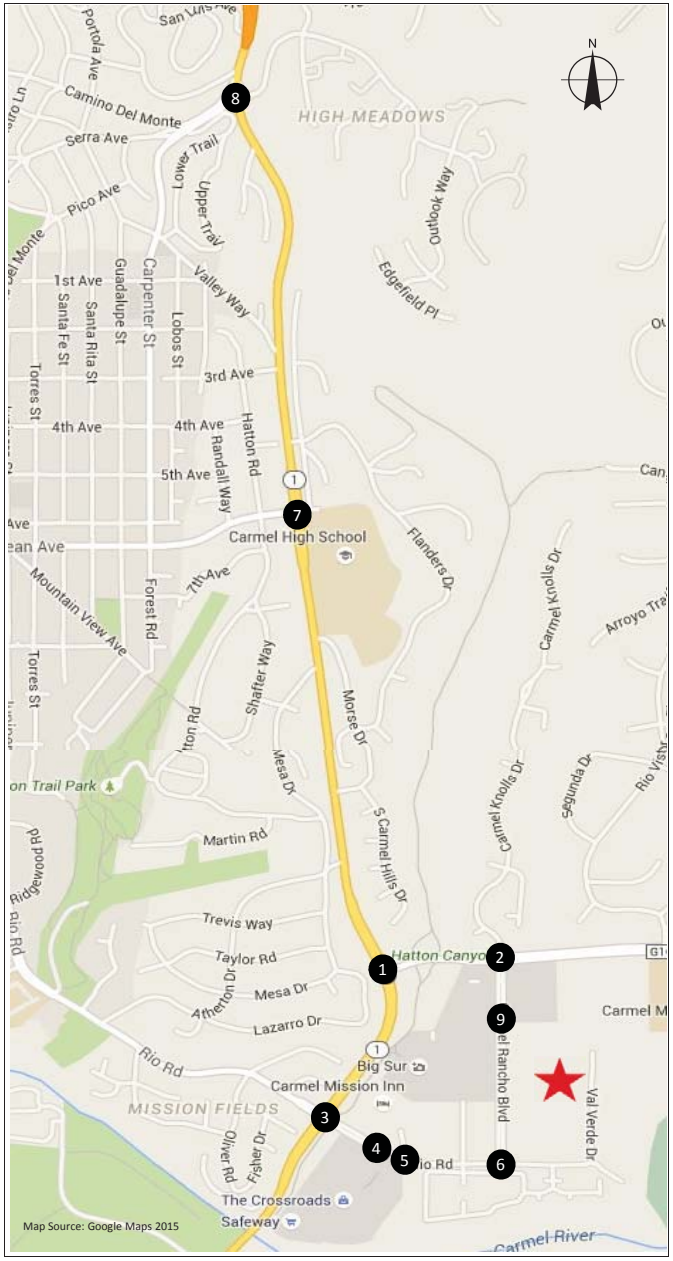
Table 4.14-21
Background plus Project Conditions Intersection Levels of Service

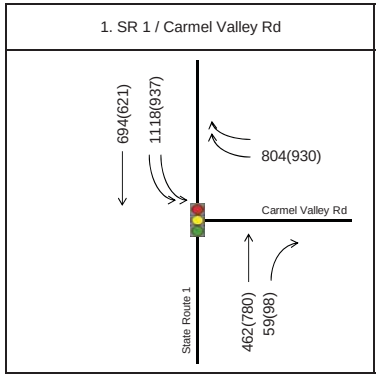
	Intersection	Control Type	Jurisdiction	LOS Standard	AM Peak Hour		PM Peak Hour	
					Delay (sec)	LOS	Delay (sec)	LOS
1	Highway 1/Carmel Valley Rd	Signal	Caltrans	C/D	12.0	B	21.1	C
2	Carmel Rancho Blvd/Carmel Valley Rd	Signal	CVMP	C	18.4	B	20.2	C
3	Highway 1/Rio Rd	Signal	Caltrans	C/D	22.9	C	38.7	**D**
4	Crossroads Blvd/Rio Rd	Signal	CVMP	C	10.1	B	12.5	B
5	Carmel Center Place/Rio Rd	Signal	CVMP	C	9.1	A	5.9	A
6	Carmel Rancho Blvd/Rio Rd	Two-Way Stop SB	CVMP	C	10.4	B	10.9	B
		EB			7.8	A	8.1	A
		WB			16.5	C	20.4	C
7	Highway 1/Ocean Ave	Signal	Caltrans	C/D	50.3	**D**	43.7	**D**
8	Highway 1/Carpenter St	Signal	Caltrans	C/D	25.1	**C**	52.8	**D**
9	Carmel Rancho Blvd/Shopping Center Dwy	Signal	CVMP	C	4.0	A	5.7	A

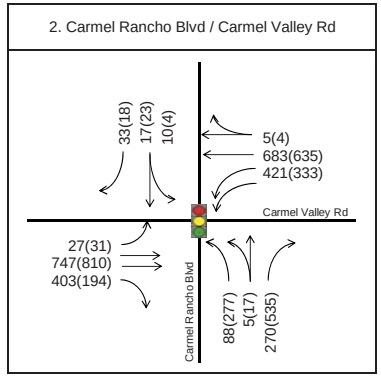
Source: Hatch Mott MacDonald, 2016.
Note: Bold indicates an exceedance of the applicable LOS standard.

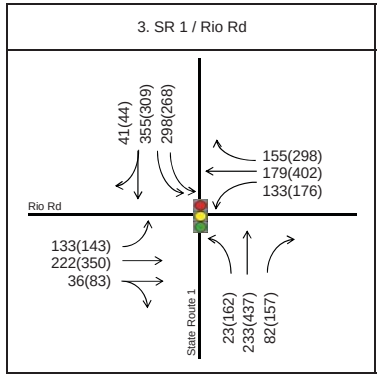
Based on Table 4.14-21 and the LOS standards described in Section 4.14.7(a) (Methodology and Significance Thresholds), the following intersections are projected to operate at unacceptable levels of service under Background plus Project conditions:

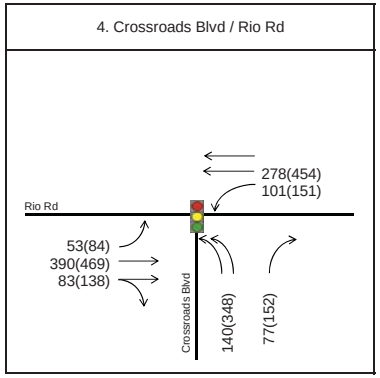
- *Intersection #3 – Highway 1/Rio Road (LOS D – PM).* This intersection is projected to operate at a deficient LOS D during the PM peak hour and traffic generated by the project is expected to increase the average delay by 0.1 second. Based on the Caltrans impact criteria, the proposed project would have an impact at this intersection during the PM peak hour and mitigation is required.
- *Intersection #7 – Highway 1/Ocean Avenue (LOS D – AM & PM).* This intersection is projected to operate at a deficient LOS D during the AM and PM peak hours and traffic generated by the project is expected to increase the average delay by 0.5 and 0.6 seconds during the AM and PM peak hours, respectively. Based on the Caltrans impact criteria, the proposed project would have an impact at this intersection during the AM and PM peak hours and mitigation is required.

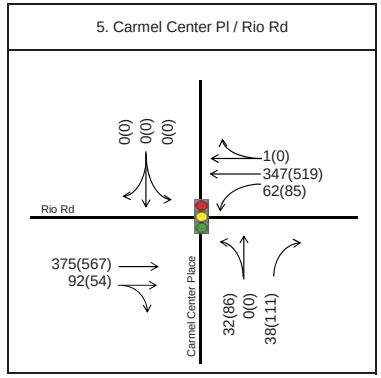


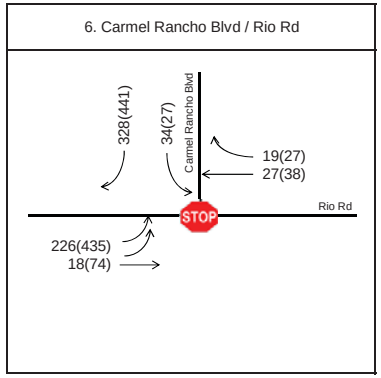


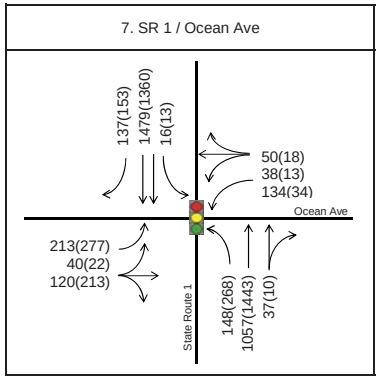


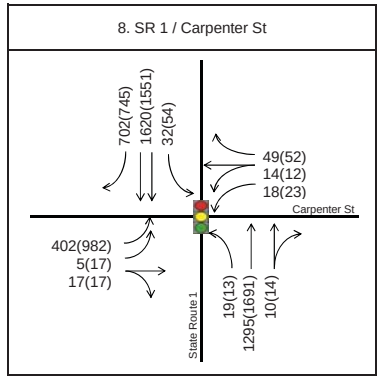


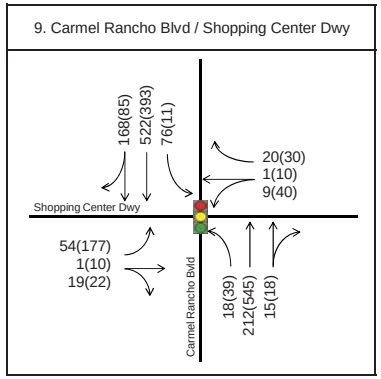












XX(YY) = AM (PM)

Source: Hatch Mott MacDonald, 2016

Background plus Project Conditions AM & PM Peak Hour Volumes

Figure 4.14-8

- *Intersection #8 – Highway 1/Carpenter Street (LOS D – PM).* This intersection is projected to operate at a deficient LOS D during the PM peak hour and traffic generated by the project is expected to increase the average delay by 0.4 second. Based on the Caltrans impact criteria, the proposed project would have an impact at this intersection during the PM peak hour and mitigation is required.

Road Segment Operations. Road segment levels of service are summarized in Tables 4.14-22 through 4.14-24.

Table 4.14-22
Background plus Project Conditions Arterial Levels of Service

Seg #	Road Segment	AM Peak Hour		PM Peak Hour	
		Speed	LOS	Speed	LOS
Northbound Carmel Rancho Blvd					
12	Rio Rd to Shopping Center Dwy	27.3	A	24.8	B
11	From Shopping Center Dwy to Carmel Valley Rd	9.2	**D**	8.5	**E**
Southbound Carmel Rancho Blvd					
11	Carmel Valley Rd to Shopping Center Dwy	18.2	C	16.6	C
12	Shopping Center Dwy to Rio Rd	22.8	B	22.5	B
Eastbound Rio Rd					
5	Atherton Dr to Highway 1	17.3	C	17.3	C
13	Highway 1 to Crossroads Blvd	12.6	**D**	11.6	**D**
14	Crossroads Blvd to Carmel Center Pl	12.1	**D**	10.9	**D**
15	Carmel Center Pl to Carmel Rancho Blvd	16.0	C	17.1	C
Westbound Rio Rd					
15	Carmel Rancho Blvd to Carmel Center Pl	20.3	B	19.6	B
14	Carmel Center Pl to Crossroads Blvd	9.6	**D**	8.3	**E**
13	Crossroads Blvd to Highway 1	7.3	**E**	7.2	**E**
5	Highway 1 to Atherton Dr	23.5	B	23.5	B
Northbound Highway 1					
1	Ocean Ave to Carpenter St	-	C	-	**D**
2	Carmel Valley Rd to Ocean Ave	-	**F**	-	C
3	Rio Rd to Carmel Valley Rd	-	**F**	-	**F**
4	Ribera Rd to Rio Rd	-	B	-	B
Southbound Highway 1					
1	Carpenter St to Ocean Ave	-	**D**	-	C
2	Ocean Ave to Carmel Valley Rd	-	C	-	C
3	Carmel Valley Rd to Rio Rd	-	C	-	**E**
4	Rio Rd to Ribera Rd	-	B	-	B

Source: Hatch Mott MacDonald, 2016. Highway 1 road segment LOS are referenced from CCTC, 2015.
Note: Bold indicates an exceedance of the applicable LOS standard.

Table 4.14-23
Background plus Project Conditions Road Segments 6 and 7 Levels of Service

Seg #	Road Segment	CVMP ADT Threshold	ADT	AM Peak Hour			PM Peak Hour		
				2-Way Volume	PTSF	LOS	2-Way Volume	PTSF	LOS
Carmel Valley Rd									
6	Robinson Canyon Rd to Schulte Rd	15,499	15,890	1,168	86.1%	**E**	1,434	86.3%	**E**
7	Schulte Rd to Rancho San Carlos Rd	16,340	17,908	1,308	89.3%	**E**	1,615	80.1%	**E**

Source: Hatch Mott MacDonald, 2016.
Note: Bold indicates an exceedance of the applicable LOS standard.

Table 4.14-24
Background plus Project Conditions Road Segments 8 - 10 Levels of Service

Seg #	Road Segment	CVMP ADT Threshold	ADT	Direction	AM Peak Hour				PM Peak Hour			
					Volume (veh/hr)	Flow Rate (pcphpl)	Density (pc/mi/ln)	LOS	Volume (veh/hr)	Flow Rate (pcphpl)	Density (pc/mi/ln)	LOS
Carmel Valley Rd												
8	Rancho San Carlos Rd to Rio Rd	48,487	21,089	EB	627	341	6.2	A	1,022	595	10.8	A
				WB	916	545	9.9	A	837	456	8.3	A
9	Rio Rd to Carmel Rancho Blvd	51,401	26,362	EB	781	435	7.9	A	1,225	675	12.3	B
				WB	1,091	657	11.9	B	1,048	565	10.3	A
10	Carmel Rancho Blvd to Highway 1	27,839	23,737	EB	1,008	549	10.0	A	947	495	9.0	A
				WB	891	513	9.3	A	1,042	574	10.4	A

Source: Hatch Mott MacDonald, 2016.
Note: Bold indicates an exceedance of the applicable LOS standard.

Based on Tables 4.14-22 through 4.14-24 and the LOS standards described in Section 4.14.7(a) (Methodology and Significance Thresholds), the following road segments are projected to operate at unacceptable levels of service under Background plus Project conditions:

- *Segment #1 – Highway 1 between Carpenter Street and Ocean Avenue*. This segment is projected to operate at a deficient LOS D in the northbound (PM) and southbound (AM) directions and the project would add traffic to this segment. Based on the Caltrans impact criteria, the project would have an impact on this road segment and mitigation is required.
- *Segment #2 – Highway 1 between Ocean Avenue and Carmel Valley Road.* This segment is projected to operate at a deficient LOS F in the northbound direction during the AM peak hour and the project would add traffic to this segment. Based on the Caltrans impact criteria, the project would have an impact and mitigation is required.
- *Segment #3 – Highway 1 between Carmel Valley Road and Rio Road*. This road segment is projected to operate at an unacceptable LOS F in the northbound direction during the AM and PM peak hours and LOS E in the southbound direction during the PM peak hour. The project would add traffic to this segment. Based on the Caltrans impact criteria, the project would have an impact on this road segment and mitigation is required.
- *Segment #6 – Carmel Valley Road between Robinson Canyon Road and Schulte Road*. The CVMP ADT thresholds are projected to be exceeded under Background traffic conditions and the project would add traffic to this segment. The project would have an impact because it would exceed the CVMP ADT Threshold. Mitigation is required.
- *Segment #7 – Carmel Valley Road between Schulte Road and Rancho San Carlos Road*. The CVMP ADT thresholds are projected to be exceeded under Background traffic conditions and the project would add traffic to this segment. The project would have an impact because it would exceed the CVMP ADT threshold. Mitigation is required.
- *Segment #11 – Carmel Rancho Boulevard between Carmel Valley Road and Shopping Center Driveway*. The proposed project would add traffic to this segment, which operates at an unacceptable LOS D and LOS E during the AM and PM peak hours in the northbound direction. This segment is not projected to exceed the CVMP ADT threshold under Background plus Proposed Project conditions because it would not worsen the LOS by one letter grade. Therefore, no mitigation is required.
- *Segment #13 – Rio Road between Highway 1 and Crossroads Boulevard*. The proposed project would add traffic to this segment, which operates at an unacceptable LOS D eastbound and LOS E westbound during the AM and PM peak hours. This segment is not projected to exceed the CVMP ADT threshold under Background plus Project conditions because it would not worsen the LOS by one letter grade. Therefore, no mitigation is required.
- *Segment #14 – Rio Road between Crossroads Blvd and Carmel Center Place*. The proposed project would add traffic to this segment, which operates at an unacceptable LOS D eastbound and LOS D and E westbound during the AM and PM peak hours. This segment is not projected to exceed the CVMP ADT threshold under Background plus Project conditions because it would not worsen the LOS by one letter grade. Therefore, no mitigation is required.

Mitigation Measures. Based on the impact analysis in the TIA and summarized above, three intersections and five roadway segments require mitigation under Background plus Project conditions. This includes intersections #3, #7, and #8, and road segments #1, #2, #3, #6, and #7.

As described previously, the TAMC RTP includes a list of projects to improve traffic operations within the project study area that would eliminate the proposed project's impact to intersection #3 (Highway 1/Rio Road) and road segment #3 (Highway 1 between Carmel Valley Road and Rio Road) in the northbound direction. While the addition of a northbound right-turn lane at SR and Carpenter Street would eliminate project-specific impacts to intersection #8 (Highway 1/Carpenter Street) and segment #1 (Highway 1 between Carpenter Street and Ocean Avenue) in the northbound direction, this improvement is not considered feasible for the reasons described under *Mitigation Measures* for Impact T-1. No other mitigation is feasible to reduce project impacts under Background plus Project Conditions.

Significance After Mitigation. While the proposed project's impact to intersection #3 and road segment #3 in the northbound direction would be eliminated with planned improvements in the TAMC RTP, the construction of these planned improvements is dependent on STIP funding, which is not guaranteed at this time. Participation in funding these improvements – as is required through payment of TAMC impact fees – would partially reduce impacts. However, because complete funding cannot be guaranteed and timing of the planned improvements cannot be assured, impacts would remain significant and unavoidable.

According to the TIA, there are no feasible improvements for intersection #7 (Highway 1/Ocean Avenue). As discussed above, there are also no feasible improvements for intersection #8 (Highway 1/Carpenter Street). Therefore, impacts to intersections #7 and #8 would remain significant and unavoidable.

There are no feasible improvements for road segment #1 or #2. Widening Highway 1 would eliminate the project's impacts to road segment #3 in the southbound direction; however, this is not feasible. Similarly, widening Carmel Valley Road to four lanes would eliminate the project's impacts to segments #6 and #7; however, this is also not considered feasible. Therefore, impacts to these segments would remain significant and unavoidable.

To summarize, project impacts to the following intersections and road segments would remain significant and unavoidable under Background plus Project conditions:

- Intersection #3
- Intersection #7
- Intersection #8
- Road segment #1 (northbound and southbound)
- Road segment #2
- Road segment #3 (northbound and southbound)
- Road segment #6
- Road segment #7

Threshold 1:	*Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit*
Threshold 2:	*Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways*

Impact T-3 **Implementation of the proposed project would result in potentially significant impacts to four study intersections and six study road segments under Cumulative plus Project conditions. Impacts to all four intersections and four of the road segments would be less than significant upon payment of regional traffic impact fees. However, impacts to the remaining two road segments cannot be mitigated. Therefore, project impacts under Cumulative plus Project conditions would be Class I, *significant and unavoidable*.**

Intersection Operations. The proposed project traffic assignments were added to the Cumulative traffic volumes to obtain Cumulative plus Project traffic volumes. Cumulative plus Project traffic volumes for the AM and PM peak hours are presented in Figure 4.14-9. Intersection levels of service are summarized in Table 4.14-25.

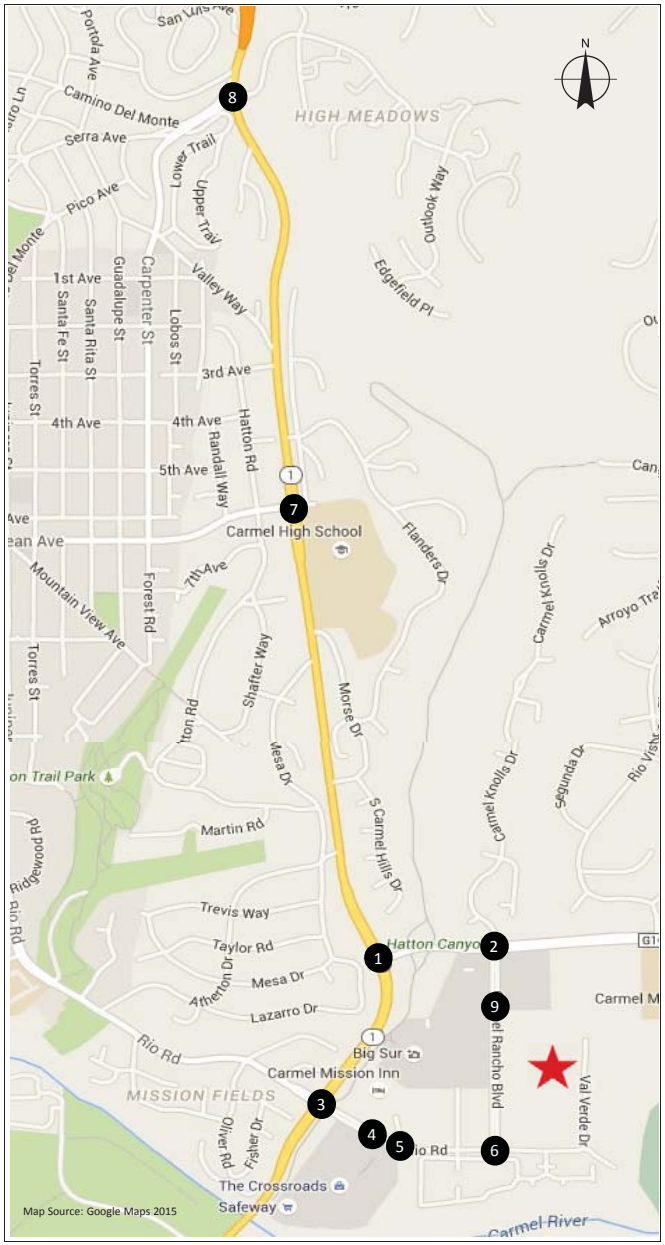
Table 4.14-25
Cumulative plus Project Conditions Intersection Levels of Service

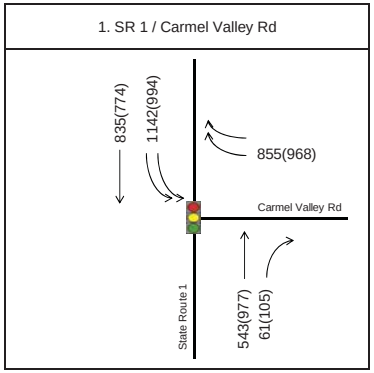
	Intersection	Control Type	Jurisdiction	LOS Standard	AM Peak Hour		PM Peak Hour	
					Delay (sec)	LOS	Delay (sec)	LOS
1	Highway 1/Carmel Valley Rd	Signal	Caltrans	C/D	14.3	B	44.0	**D**
2	Carmel Rancho Blvd/Carmel Valley Rd	Signal	CVMP	C	22.2	C	22.7	C
3	Highway 1/Rio Rd	Signal	Caltrans	C/D	26.9	C	54.4	**D**
4	Crossroads Blvd/Rio Rd	Signal	CVMP	C	20.1	C	32.7	C
5	Carmel Center Place/Rio Rd	Signal	CVMP	C	6.1	A	7.8	A
6	Carmel Rancho Blvd/Rio Rd	Two-Way Stop SB	CVMP	C	10.9	B	11.7	B
		EB			7.8	A	8.3	A
		WB			18.3	C	22.2	C
7	Highway 1/Ocean Ave	Signal	Caltrans	C/D	71.8	**E**	68.4	**E**
8	Highway 1/Carpenter St	Signal	Caltrans	C/D	32.4	**C**	77.9	**E**
9	Carmel Rancho Blvd/Shopping Center Dwy	Signal	CVMP	C	4.0	A	5.8	A

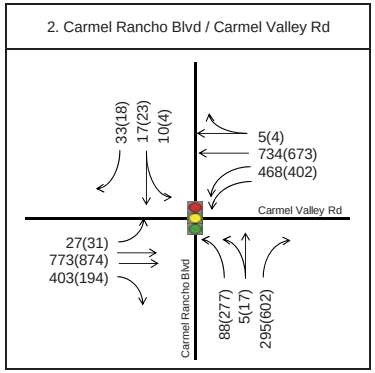
Source: Hatch Mott MacDonald, 2016.
Note: Bold indicates an exceedance of the applicable LOS standard.

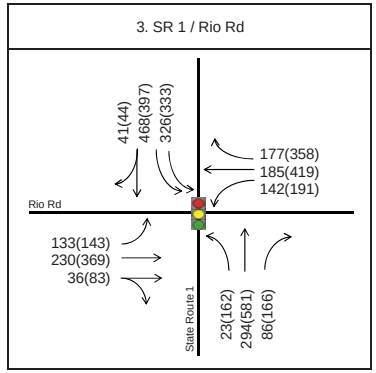
Based on Table 4.14-25 and the LOS standards described in Section 4.14.7(a) (Methodology and Significance Thresholds), the following intersections are projected to operate at unacceptable levels of service under Cumulative plus Project conditions:

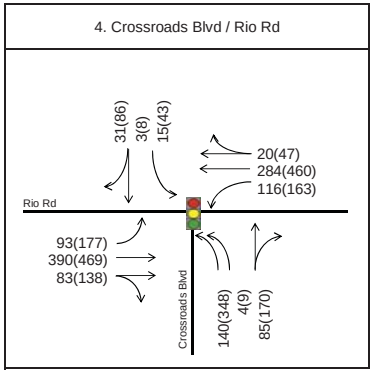
- *Intersection #1 – Highway 1/Carmel Valley Road (LOS D – PM).* This intersection is projected to operate at a deficient LOS D during the PM peak hour and traffic generated by the project is expected to increase the average delay by 0.5 seconds. Based on the Caltrans impact criteria the project would have a cumulative impact and mitigation is required.
- *Intersection #3 – Highway 1/Rio Road (LOS D – PM).* This intersection is projected to operate at a deficient LOS D during the PM peak hour and traffic generated by the project is expected to increase the average delay by 0.4 seconds. Based on the Caltrans impact criteria the project would have a cumulative impact and mitigation is required.
- *Intersection #7 – Highway 1/Ocean Avenue (LOS E – AM & PM).* This intersection is projected to operate at a deficient LOS E during the AM and PM peak hours and traffic generated by the project is expected to increase the average delay by 0.4 and 0.9 seconds during the AM and PM peak hours, respectively. Based on the Caltrans impact criteria the project would have a cumulative impact and mitigation is required.
- *Intersection #8 – Highway 1/Carpenter Street (LOS D – PM).* This intersection is projected to operate at a deficient LOS D during the PM peak hour and traffic generated by the project is expected to increase the average delay by 0.4 seconds. Based on the Caltrans impact criteria the project would have a cumulative impact and mitigation is required.

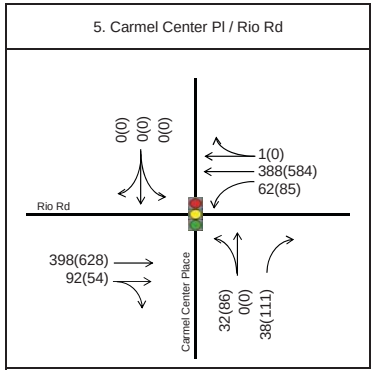


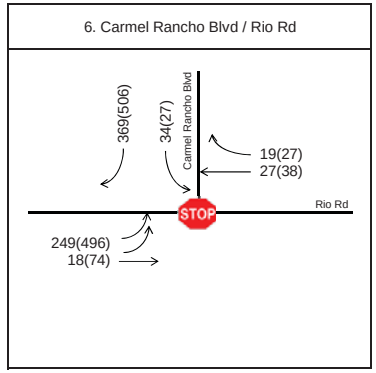


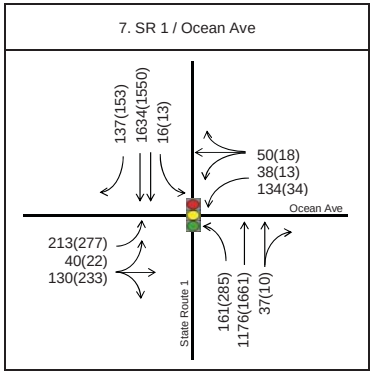


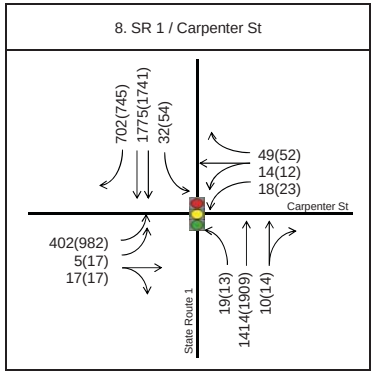


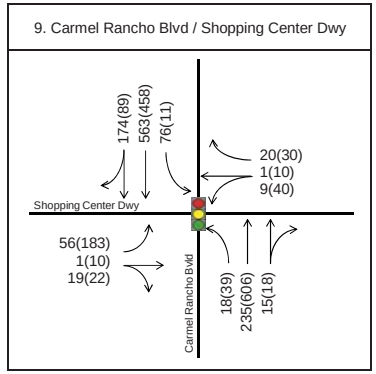












XX(YY) = AM (PM)

Source: Hatch Mott MacDonald, 2016

Cumulative plus Project Conditions AM & PM Peak Hour Volumes

Figure 4.14-9

Road Segment Operations. Road segment levels of service are summarized in Tables 4.14-26 through 4.14-28.

Table 4.14-26
Cumulative plus Project Conditions Arterial Levels of Service

Seg #	Road Segment	AM Peak Hour		PM Peak Hour	
		Speed	LOS	Speed	LOS
Northbound Carmel Rancho Blvd					
12	Rio Rd to Shopping Center Dwy	27.3	A	24.7	B
11	From Shopping Center Dwy to Carmel Valley Rd	9.1	**D**	8.2	**E**
Southbound Carmel Rancho Blvd					
11	Carmel Valley Rd to Shopping Center Dwy	18.1	C	16.5	C
12	Shopping Center Dwy to Rio Rd	22.5	B	22.1	B
Eastbound Rio Rd					
5	Atherton Dr to Highway 1	17.1	C	17.0	C
13	Highway 1 to Crossroads Blvd	10.9	**D**	9.1	**D**
14	Crossroads Blvd to Carmel Center Pl	8.9	**E**	7.8	**E**
15	Carmel Center Pl to Carmel Rancho Blvd	16.0	C	17.0	C
Westbound Rio Rd					
15	Carmel Rancho Blvd to Carmel Center Pl	20.3	B	19.6	B
14	Carmel Center Pl to Crossroads Blvd	6.8*	**F**	4.8*	**F**
13	Crossroads Blvd to Highway 1	7.2	**E**	6.9	**F**
5	Highway 1 to Atherton Dr	23.5	B	23.5	B
Northbound Highway 1					
1	Ocean Ave to Carpenter St	-	C	-	**D**
2	Carmel Valley Rd to Ocean Ave	-	**F**	-	C
3	Rio Rd to Carmel Valley Rd	-	**F**	-	**F**
4	Ribera Rd to Rio Rd	-	B	-	B
Southbound Highway 1					
1	Carpenter St to Ocean Ave	-	**D**	-	C
2	Ocean Ave to Carmel Valley Rd	-	C	-	C
3	Carmel Valley Rd to Rio Rd	-	C	-	**E**
4	Rio Rd to Ribera Rd	-	B	-	B

Source: Hatch Mott MacDonald, 2016. Highway 1 road segment LOS are referenced from CCTC, 2015.
Note: Bold indicates an exceedance of the applicable LOS standard.

Table 4.14-27
Cumulative plus Project Conditions Road Segments 6 and 7 Levels of Service

Seg #	Road Segment	CVMP ADT Threshold	ADT	AM Peak Hour			PM Peak Hour		
				2-Way Volume	PTSF	LOS	2-Way Volume	PTSF	LOS
Carmel Valley Rd									
6	Robinson Canyon Rd to Schulte Rd	15,499	17,150	1,245	87.8%	**E**	1,260	87.9%	**E**
7	Schulte Rd to Rancho San Carlos Rd	16,340	19,168	1,385	89.5%	**E**	1,741	90.6%	**E**

Source: Hatch Mott MacDonald, 2016.
Note: Bold indicates an exceedance of the applicable LOS standard.

Table 4.14-28
Cumulative plus Project Conditions Road Segments 8 - 10 Levels of Service

Seg #	Road Segment	CVMP ADT Threshold	ADT	Direction	AM Peak Hour				PM Peak Hour			
					Volume (veh/hr)	Flow Rate (pcphpl)	Density (pc/mi/ln)	LOS	Volume (veh/hr)	Flow Rate (pcphpl)	Density (pc/mi/ln)	LOS
Carmel Valley Rd												
8	Rancho San Carlos Rd to Rio Rd	48,487	22,749	EB	672	366	6.7	A	1,101	641	11.7	B
				WB	964	574	10.4	A	924	503	9.7	A
9	Rio Rd to Carmel Rancho Blvd	51,401	28,742	EB	832	463	8.4	A	1,356	747	13.6	B
				WB	1,189	716	13.0	B	1,155	623	11.3	B
10	Carmel Rancho Blvd to Highway 1	27,839	24,757	EB	1,034	563	10.2	A	1,011	528	9.6	A
				WB	912	543	9.9	A	1,080	595	10.8	A

Source: Hatch Mott MacDonald, 2016.
Note: Bold indicates an exceedance of the applicable LOS standard.

Based on Tables 4.14-26 through 4.14-28 and the LOS standards described in Section 4.14.7(a) (Methodology and Significance Thresholds), the following road segments are projected to operate at unacceptable levels of service under Cumulative plus Project conditions:

- *Segment #1 – Highway 1 between Carpenter Street and Ocean Avenue*. This segment is projected to operate at a deficient LOS D in the northbound (PM) and southbound (AM) directions and the project would add traffic to this segment. Based on the Caltrans impact criteria, the project would have a cumulative impact on this road segment and mitigation is required.
- *Segment #2 – Highway 1 between Ocean Avenue and Carmel Valley Road*. This segment is projected to operate at a deficient LOS F in the northbound direction during the AM peak hour and the project would add traffic to this segment. Based on the Caltrans impact criteria, the project would have a cumulative impact and mitigation is required.
- *Segment #3 – Highway 1 between Carmel Valley Road and Rio Road*. This road segment is projected to operate at an unacceptable LOS F in the northbound direction during the AM and PM peak hours and LOS E in the southbound direction during the PM peak hour. The project would add traffic to this segment. Based on the Caltrans impact criteria, the project would have a cumulative impact on this road segment and mitigation is required.
- *Segment #6 – Carmel Valley Road between Robinson Canyon Road and Schulte Road*. The CVMP ADT thresholds are projected to be exceeded under Cumulative traffic conditions and the project would add traffic to this segment. The project would have an impact because it would exceed the CVMP ADT Threshold. Mitigation is required.
- *Segment #7 – Carmel Valley Road between Schulte Road and Rancho San Carlos Road*. The CVMP ADT thresholds are projected to be exceeded under Cumulative traffic conditions and the project would add traffic to this segment. The project would have an impact because it would exceed the CVMP ADT threshold. Mitigation is required.
- *Segment #13 – Rio Road between Highway 1 and Crossroads Boulevard*. This segment is projected to operate at a deficient LOS F (PM) in the westbound direction without the project. Traffic generated by the project is not expected to decrease the average travel speed; however, any traffic added to a segment operating at LOS F is considered an impact.
- *Segment #14 – Rio Road between Crossroads Blvd and Carmel Center Place*. This segment is projected to operate at a deficient LOS E (AM & PM) in the eastbound direction and LOS F (AM & PM) in the westbound direction without the project. Traffic generated by the project is not expected to decrease the average travel speed; however, any traffic added to a segment operating at LOS F is considered a potential impact. However, this road segment is bounded by two closely spaced signalized intersections (approximately 220 feet apart), and the flow of traffic on this segment is controlled by the adjacent signal operations, which are projected to operate at an acceptable LOS C and LOS A under Cumulative plus Project conditions. As a result, the proposed project is not expected to have an impact on this segment.

Mitigation Measures. Based on the impact analysis in the TIA and summarized above, four intersections and six roadway segments require mitigation under Background plus Project conditions. This includes intersections #1, #3, #7, and #8, and road segments #1, #2, #3, #6, #7, and #13.

The TAMC RTP includes a list of projects to improve traffic operations within the project study area that would eliminate the proposed project's impact to intersections #1 (Highway 1/Carmel Valley Road) and #3 (Highway 1/Rio Road). As described previously, the construction of these planned improvements is dependent on STIP funding, which cannot be guaranteed. In addition, there are no planned or feasible improvements to mitigate impacts to intersections #7 (Highway 1/Ocean Avenue) and #8 (Highway 1/Carpenter Avenue). However, both TAMC and Caltrans consider payment of regional development impact fees as adequate mitigation for cumulative impacts to state highways and the regional road network. The project applicant would be required to pay regional fees to the CVTIP, TAMC, and Monterey County, as described under *Funding for Transportation Improvements* in Section 4.14.7(a) (Methodology and Significance Thresholds). Because payment of these fees is required and would mitigate cumulative impacts, impacts to intersections under Cumulative plus Project conditions would be less than significant.

For Highway 1 roadway segments – which include study segments #1, #2, and #3 – payment of regional fees would similarly reduce project impacts to a less than significant level. For segments #6 and #7, impacts would be eliminated by widening Carmel Valley Road to four lanes. However, this improvement is not considered feasible and is therefore not required as mitigation.

For segment #13, project impacts would be eliminated with planned improvements in the TAMC RTP. No further mitigation is required.

Significance After Mitigation. Impacts to all four impacted intersections (#1, #3, #7, and #8) and road segments #1, #2, #3, and #13 would be less than significant upon payment of regional traffic impact fees. Impacts to segments #6 and #7 would remain significant and unavoidable.

c. SB 743 and Vehicle Miles Travelled. A VMT analysis was not performed for the proposed project. However, the project is located in close proximity to three major shopping centers (i.e., The Barnyard, Crossroads and Carmel Rancho Shopping Centers) and public transportation. Specifically, the project site is located in close proximity to a wide variety of public-serving businesses, including the following:

- Grocery Stores: 3
- Banks: 5
- Restaurants: 14
- Coffee Shops: 3
- Bakery: 2
- Post Office: 1
- Brokerage Houses: 2
- Gas Stations: 2
- Hair Salons: 3
- Hardware Stores: 2
- Pet Supply and Vet Services: 3
- Clothing & Jewelry Stores: 8
- Various Home Decorator Stores: 6
- Title Companies: 2
- Real Estate Offices: 3
- Doctors and Dentists: 7
- Copy Center: 1
- Book Store: 1
- Liquor Stores: 4
- Law Offices: 3
- Galleries: 3

All of the businesses listed above are within an eight to eighteen-minute walk of the proposed project. In addition, there are four transit stops in the project area, providing access to County-

wide public transportation. For these reasons, it is anticipated that the proposed project likely would meet the primary goal of SB 743 by reducing VMT and greenhouse gas emissions (Hatch Mott MacDonald, 2016).

4.15 UTILITIES AND SERVICE SYSTEMS

4.15.1 Summary

Table 4.15-1 summarizes the identified environmental impacts, proposed mitigation measures, and residual impacts of the proposed project with regard to utilities and service systems. Additional detail is provided in Section 4.15.3 (Impact Analysis).

Table 4.15-1
Impact and Mitigation Summary: Utilities and Service Systems

Impact	Mitigation Measures	Residual Impact
Impact U-1 The proposed project would generate approximately 4,650 gallons per day (GPD) of wastewater, which could be accommodated within the existing capacity of the CAWD Water Pollution Control Plant. Impacts would be Class III, less than significant.	No mitigation is required.	Impacts would be less than significant without mitigation.
Impact U-2 A new sewer connection would be required from the project site to the existing CAWD sewer line beneath Rio Road. Additionally, two existing groundwater production wells would provide potable water to the site. Impacts would be Class II, significant but mitigable.	**U-2 New Sewer Line**. New Sewer Line. The applicant shall construct a new sewer line to connect to the CAWD sewer system. The new sewer line shall run from the project site south down the centerline of Val Verde Drive to Rio Road. The piping within Val Verde Road shall measure 12 inches in diameter. At Rio Road, the new sewer line shall turn 90 degrees to the west and transition to 24 inch diameter piping. Manhole access shall be provided. The new 24 inch sewer line shall then run approximately 300 feet west under Rio Road to connect with the CAWD sewer line at an existing manhole in Rio Road. The required sizing is subject to Mitigation Measure O-1 in Section 5.0, *Other CEQA Required Sections*. Design of the new sewer connection shall be submitted to and approved by Monterey County RMA – Public Works and CAWD prior to issuance of grading permits. The new connection shall be installed prior to issuance of occupancy permits.	Implementation of Mitigation Measure U-2 would result in temporary construction impacts, since the installation of the required new sewer line beneath Val Verde Drive and Rio Road would require the operation of heavy equipment. This construction activity would result in increased emissions and potential noise and air quality impacts. However, the emissions associated with the implementation of Mitigation Measure U-2 are not expected to exceed and air quality thresholds or result in a cumulatively considerable net increase of any criteria pollutant. Construction activities would be limited to standard daytime hours and would comply with adopted noise standards. Finally, the new sewer line and manhole required by Mitigation Measure U-2 would be constructed entirely within the existing roadways of Val Verde Drive and Rio Road. Therefore, impacts related to agricultural resources, biological and cultural resources, and geology and soils would be less than significant. Because the sewer line would be constructed within existing rights-of-way, long-term effects of the required sewer line, such as aesthetics and drainage, would be less than significant.
Impact U-3 The amount of solid waste that would be generated during construction and operation of the proposed project would not exceed the surplus capacity of the landfill serving the site. Impacts would be Class III, less than significant.	No mitigation is required.	Impacts would be less than significant without mitigation.

4.15.2 Setting

a. Water Supply. A Community Water System (CWS) sourced from two existing on-site wells would supply domestic and irrigation water for the project. These two wells both have historical production and water rights to the Carmel Valley Alluvial Aquifer (CVAA). The CVAA is described further in Section 4.8, *Hydrology and Water Quality.*

The Travers Well would be the primary well serving the site. The Gamboa Replacement Well, which was drilled in 2012 to replace the existing Gamboa Well due to deterioration causing a health and safety issue, would be the back-up source for the CWS. A 24-foot by 12-foot by 10-foot water treatment unit would ensure the pumped groundwater meets state standards. Two 4,500 gallon tanks would store the treated water. Treated water would be conveyed through a conventional gravity system of proposed 8-inch water pipes located within proposed street right-of-ways.

b. Wastewater. Sanitary sewer service to the project area is provided by the Carmel Area Wastewater District (CAWD). The CAWD sewer collection system consists of approximately 83 miles of gravity sewers, five miles of force mains, seven pump stations, and over 1,500 manholes (CAWD, 2016a). Wastewater is treated at the CAWD Water Pollution Control Plant. The plant has a design capacity to treat up to 4.0 million gallons per day (MGD) and has a permitted capacity of 3.0 MGD of primary domestic wastewater. The current average dry weather flow is approximately 1.3 MGD, which is 43% of the permitted capacity or 33% of design capacity (Lander, 2016a).

c. Stormwater. There is currently no stormwater drainage infrastructure on the project site. The site is predominantly undeveloped pervious surfaces used for annual row crop agriculture. The driveway for the existing single family residence on the site is unpaved. Additionally, there is currently no stormwater drains or gutters along Val Verde Drive in the proximity of the project. Therefore, stormwater is able to infiltrate on site.

d. Solid Waste. Solid waste collection and disposal in the project area is carried out by private hauler Waste Management. Waste is hauled to and disposed of at the Monterey Regional Waste Management District (MRWMD) owned Monterey Peninsula Landfill, located approximately 14 miles northeast of the project site in Marina. The Monterey Peninsula Landfill has a design capacity of approximately 84 million cubic yards. The remaining landfill waste capacity is approximately 71 million cubic yards which is projected to last 150 years at present recycling and disposal rates (MRWMD, 2014). The MRWMD's Materials Recovery Facility currently has one of the highest diversion rates in California. Currently, more than 50% of mixed waste is recycled, reused and diverted from the landfill (MRWMD, 2014).

Due to the large waste capacity of the Monterey Peninsula Landfill, solid waste could be disposed of at this facility during the life of the project. Table 4.15-2 identifies the location, permitted capacity, and remaining capacity of the Monterey Peninsula Landfill.

Table 4.15-2
Existing and Remaining Capacity of the Monterey Peninsula Landfill

Permitted Capacity (million cubic yards)	Remaining Capacity (million cubic yards)	Remaining Capacity (%)	Maximum Throughput (tons/day)	Estimated Daily Throughput (tons/day)	Remaining Daily Capacity (tons/day)
84	71	84	3,500	< 1,000	> 2,500

e. Regulatory Setting.

State.

Senate Bill 610. Senate Bill (SB) 610 was signed into law in 2001. This law requires cities and counties to develop water supply assessments (WSAs) when considering approval of applicable development projects in order to determine whether projected water supplies can meet the project's anticipated water demand. Triggers requiring the preparation of a WSA include residential developments of more than 500 dwelling units, shopping centers or business establishments employing more than 1,000 persons or having more than 500,000 square feet of floor space, commercial office buildings employing more than 1,000 persons or having more than 250,000 square feet of floor space, and projects that would demand an amount of water equivalent to, or greater than, the amount of water required by a 500 dwelling unit project. The proposed project does not require preparation of a WSA pursuant to SB 610, as less than 500 dwelling units are proposed.

Senate Bill 221. Whereas SB 610 requires a written assessment of water supply availability, SB 221 requires lead agencies to obtain an affirmative written verification of sufficient water supply prior to approval of certain specified subdivision projects. For this purpose, water suppliers may rely on an Urban Water Management Plan, a WSA prepared for the project, or other acceptable information that constitutes "substantial evidence."

Urban Water Management Planning Act of 1983 (Assembly Bill 901). The Urban Water Management Planning Act (Div. 6, Part 2.6 of the Water Code sections 10610-10656) requires that an Urban Water Management Plan (UWMP) be prepared by California's urban water suppliers to support their long-term resource planning and ensure adequate water supplies are available to meet existing and future water demands. Every urban water supplier that either provides over 3,000 acre-feet of water annually or serves 3,000 or more connections is required to assess the reliability of its water sources over a 20-year planning horizon considering normal, dry and multiple dry years. This assessment is to be included in its UWMP, which must be prepared every five years and submitted to the Department of Water Resources (DWR). DWR then reviews the submitted UWMP to make sure it meets the requirements of the UWMP Act. The project would be served by a two private on-site wells. Therefore, it is not covered under an UWMP.

Water Conservation in Landscaping Act. The Water Conservation in Landscaping Act, enacted in 2006, required the DWR to update the Model Water Efficient Landscape Ordinance (MWELO). In 2009, the Office of Administrative Law (OAL) approved the updated MWELO, which required a retail water supplier or a county to adopt the provisions of the MWELO by January 1, 2010, or enact its own provisions equal to or more restrictive than the MWELO

provisions. The project site is under the jurisdiction of the Monterey Peninsula Water Management District (MPWMD). The MPWMD has adopted Ordinance No. 167, which enacts rules and regulations to meet the California Model Water Efficient Landscape Ordinance. The MWELO applies to all new construction, and requires, among other things, weather-based irrigation controllers or soil-moisture based controllers or other self-adjusting irrigation controllers for irrigation scheduling in all irrigation systems.

In 2009, Governor Schwarzenegger signed SB No. 7 (SBX7-7), which established a statewide goal of achieving a 20% reduction in urban per capita water use by 2020 for urban retail water suppliers.

Green Building Standards Code. In January 2010, the California Building Standards Commission adopted the statewide mandatory Green Building Standards Code (hereafter the "CAL Green Code") that requires the installation of water-efficient indoor infrastructure for all new projects beginning after January 1, 2011. CAL Green Code was incorporated as Part 11 into Title 24 of the California Code of Regulations. The Cal Green Code was revised in 2013 with the revisions taking effect on January 1, 2014; however, these revisions do not have substantial implications to the water use already contemplated by the 2010 Cal Green Code. The CAL Green Code applies to the planning, design, operation, construction, use and occupancy of every newly constructed building or structure. All new development must satisfy the indoor water use infrastructure standards necessary to meet the CAL Green Code.

The CAL Green Code requires residential and nonresidential water efficiency and conservation measures for new buildings and structures that will reduce the overall potable water use inside the building by 20%. The 20% water savings can be achieved in one of the following ways: (1) installation of plumbing fixtures and fittings that meet the 20% reduced flow rate specified in the CAL Green Code, or (2) by demonstrating a 20% reduction in water use from the building "water use baseline."

California Integrated Waste Management Act. California's Integrated Waste Management Act of 1989 (AB 939) requires that cities and counties divert 50% of all solid waste from landfills as of January 1, 2000 through source reduction, recycling, and composting. AB 939 also establishes a goal for all California counties to provide at least 15 years of ongoing landfill capacity. To help achieve this goal, the Act requires that each city and county prepare a Source Reduction and Recycling Element to be submitted to the Department of Resources Recycling and Recovery (CalRecycle), a department within the California Natural Resources Agency, which administers programs formerly managed by the State's Integrated Waste Management Board and Division of Recycling. As part of California's Integrated Waste Management Board's (CIWMB) Zero Waste Campaign, regulations affect what common household items can be placed in the trash. As of February 2006, household materials including fluorescent lamps and tubes, batteries, electronic devices and thermostats that contain mercury are no longer permitted in the trash and must be disposed of separately.

In 2007, SB 1016 amended AB 939 to establish a per capita disposal measurement system. The per capita disposal measurement system is based on a jurisdiction's reported total disposal of solid waste divided by a jurisdiction's population. CIWMB sets a target per capita disposal rate for each jurisdiction. Each jurisdiction must submit an annual report to CIWMB with an update

of its progress in implementing diversion programs and its current per capita disposal rate. Monterey County has a target residential disposal rate of 11 pounds per person per day. As of 2014, Monterey County achieved these targets with a disposal rate of 5.7 pounds per resident per day; thus, the County currently meets its disposal target (CalRecycle 2015a). Similarly, Carmel By the Sea has a target of 15.9 pounds per person per day and in 2014 they have achieved 7.4 pounds per person per day (CalRecycle, 2015b).

CALGreen Building Code. The California Green Building Standards Code (CALGreen Code) came into effect for all projects beginning after January 1, 2011. Section 4.408, Construction Waste Reduction Disposal and Recycling mandates that, in the absence of a more stringent local ordinance, a minimum of 50 % of non-hazardous construction and demolition debris must be recycled or salvaged. The Code requires the applicant to have a waste management plan for on-site sorting of construction debris.

Local.

Monterey County General Plan. The 2010 Monterey County General Plan Land Use Element and Public Services Element provide the following goals, policies and objectives pertaining to water supply and distribution, wastewater management, and stormwater management applicable to this project. Land Use goals LU-1 and LU-2 aim to concentrate development in areas where suitable access to services and facilities such as water and sewer. Policies such as LU-1.4 encourage development in areas with adequate service by aiming to develop in designated areas and to phase development to provide for long range planning of services and facilities. Additionally, Policy LU-2.22 aims to design communities to achieve a sustainable, balanced and integrated community offering adequate public facilities and services.

Goal PS-1, within the Public Services Element, aims to "ensure adequate public facilities, services, and infrastructure to support new development." Additionally, Goals PS-2 and PS-3 aim to ensure an adequate and safe water supply for any new development. These goals are supported by Policy PS-1.6 which states that "only those developments that have or can provide adequate public services and facilities shall be approved." Further, Goal PS-4 requires the adequate treatment and disposal of wastewater. This is supported by Policy PS-4.1, which establishes that "New development shall assure that adequate wastewater treatment facilities are completed concurrent with new development."

The Public Services Element additionally contains goals and policies that relate to the management of solid waste within Monterey County. Goal PS-5 aims to maximize the diversion of waste from landfills and Goal PS-6 calls for the safe and efficient disposal of solid waste. These goals are supported by policies such as PS-6.5, which states that "New development projects shall provide for handling of waste in a manner that conforms to State-mandated diversion and recycling goals. Site development plans shall include adequate solid waste recycling collection areas."

Carmel Valley Master Plan. The Carmel Valley Master Plan (CVMP) Public Services Element provides the following policies and objectives pertaining to water supply and distribution applicable to this project:

CV-5.1 Pumping from the Carmel River aquifer shall be managed in a manner consistent with the Carmel River Management Program. All beneficial uses of the total water resources of the Carmel River and its tributaries shall be considered and provided for in planning decisions.

Further, Policy CV-5.3 calls for development to incorporate designs with water reclamation, conservation, and new source production in an effort to maintain ecological and economic environments, the area's rural character, and to create additional water for the area.

With regards to wastewater, the CVMP is primarily concerned with projects that propose on-site wastewater treatment facilities. The proposed project would connect to the CAWD treatment plant; therefore, these CVMP policies would not apply.

Monterey Peninsula Water Management District. The Monterey Peninsula Water Management District (MPWMD) is the local agency responsible for the management and protection of water resources in the Carmel Valley. MPWMD has local integrated control of water resources, including groundwater. MPWMD rules 50 through 59 regulate the construction, permitting, metering and reporting of wells within their jurisdiction. All new wells must be metered, inspected and approved by MPWMD and must report annual production. Additionally, as discussed above, MPWMD Ordinance 167 was adopted in 2015 and establishes efficiency standards for appliances and irrigation. MPWMD Board of Directors considered the first and second reading of draft Ordinance 175 in October 2016 and November 2016, respectively. Draft Ordinance 175 would change how base production would be set for new development that depends on the Carmel Valley Alluvial Aquifer for water supply.

4.15.3 Impact Analysis

a. Methodology and Significance Thresholds

Methodology. Available information pertaining to utilities and service systems was reviewed during this analysis including, but not limited to, the Monterey County General Plan (County of Monterey, 2010) and the CVMP (County of Monterey, 2013). Local utility providers such as MRWMD and CAWD were contacted to determine the scale of their current commitments and their capacity to accept additional demand from the proposed project.

Because the water supply for the proposed project would be provided by two existing on-site private wells, analysis of water supply impacts is covered in Section 4.8, *Hydrology and Water Quality*.

Significance Thresholds. The following thresholds for measuring a project's environmental impacts are based on CEQA Guidelines and standards used by the County of Monterey. For the purposes of this Draft EIR, impacts to utilities and service systems are considered significant if the project would:

1. *Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board;*

2. *Require or result in the construction of new water or wastewater treatment or expansion of existing facilities, the construction of which could cause significant environmental effects;*
3. *Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects;*
4. *Have insufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements required*;
5. *Result in a determination by the wastewater treatment provider which serves or may serve the project that is has inadequate capacity to serve the projects projected demand in addition to the provider's existing commitments;*
6. *Not be served by a landfill with sufficient capacity to accommodate the projects solid waste disposal needs; and/or*
7. *Not comply with federal, state and local statutes and regulations related to solid waste?*

Thresholds 3 and 4 are discussed in Section 4.8, *Hydrology and Water Quality*. The remaining thresholds are discussed below.

b. Project Impacts and Mitigation Measures.

Threshold 1:	*Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board.*
Threshold 5:	*Result in a determination by the wastewater treatment provider which serves or may serve the project that it has inadequate capacity to serve the projects projected demand in addition to the provider's existing commitments.*

Impact U-1 **The proposed project would generate approximately 4,650 gallons per day (GPD) of wastewater, which could be accommodated within the existing capacity of the CAWD Water Pollution Control Plant. Impacts would be Class III, *less than significant*.**

Wastewater from the proposed project would be sent to the CAWD Water Pollution Control Plant, approximately one mile west of the project site. The Plant is a secondary type plant utilizing active sludge process for secondary treatment. The Plant currently operates under the NPDES permit number CA0047996 and meets the standards of the Central Coast RWQCB set forth in order number R3-2014-0012 (CCRWQCB, 2014).

The Plant is designed for 4.0 MGD and has a current permitted capacity of 3.0 MGD (CAWD, 2011). The current average dry weather flow (ADWF) for the Plant is approximately 1.5 MGD, representing 50% of the permitted capacity (Lander, 2016a). Wastewater generation within the CAWD service area is estimated by assuming 150 gallons per day (GPD) per residential unit, for all residential unit types (Lander, 2015). Using these assumptions, the 31 proposed on-site units would generate a total of approximately 4,650 GPD of wastewater. This is well within the 1.5 MGD remaining capacity of the existing Plant. The CAWD issued a Verification of Sewer Service Availability for the project on April 1, 2016 (CAWD, 2016b).

Because wastewater generated by the proposed project could be accommodated within existing CAWD treatment facilities, and because these facilities meet wastewater treatment requirements of the Central Coast RWQCB, impacts would be less than significant.

Mitigation Measures. No mitigation is required.

Significance After Mitigation. Impacts would be less than significant.

Threshold 2:	*Require or result in the construction of new water or wastewater treatment or expansion of existing facilities, the construction of which could cause significant environmental effects.*

Impact U-2 A new sewer connection would be required from the project site to the existing CAWD sewer line beneath Rio Road. Additionally, two existing groundwater production wells would provide potable water to the site. Impacts would be Class II, *significant but mitigable*.

As discussed above, the CAWD issued a Verification of Sewer Service Availability for the project (April 1, 2016), which confirms adequate capacity in CAWD facilities to accommodate increased wastewater flows from the project. The project site is currently outside of the CAWD boundaries and would have to be annexed to the CAWD through the Local Agency Formation Commission process prior to connection to the CAWD sewer system. CAWD is currently processing the regional annexation that would bring a designated portion of the mouth of the Carmel Valley, including the project site, within CAWD boundaries. The application for annexation was approved by the Local Agency Formation Commission (LAFCO) Board on June 27, 2016 and a resolution of acceptance is anticipated for August 2016 (Lander, 2016c).

Currently, there is a sewer line running along the southern boundary of the project site, which turns south at the southwest corner of the site to connect with the CAWD sewer beneath Rio Road, approximately 400 feet south of the project site. However, this existing sewer line passes through private properties and under existing single family residences south of the project site, which creates potential maintenance access issues (Lander, 2016b). Therefore, the CAWD would require the project applicant to construct an alternate sewer line route to connect to the existing sewer system in Rio Road (Lander, 2016b). A new connection to the CAWD sewer system is not currently part of the proposed project. Therefore, mitigation is included to require the construction of the new sewer connection.

Water supply to the project would be provided by two new existing on-site production wells and delivered through new water conveyance pipes within the site. The project would also include two 15,000 gallon water storage tanks and water treatment system. The production wells, conveyance system, storage tanks, and water treatment system would be entirely within the project site boundaries and would serve only the proposed project residences. Therefore, impacts associated with water facilities would be less than significant.

Mitigation Measures. Mitigation measure U-2 is required to connect the proposed project with the existing CAWD sewer system.

U-2 **New Sewer Line**. The applicant shall construct a new sewer line to connect to the CAWD sewer system. The new sewer line shall run from the project site south down the centerline of Val Verde Drive to Rio Road. The piping within Val Verde Road shall measure 12 inches in diameter. At Rio Road, the new sewer line shall turn 90 degrees to the west and transition to 24 inch diameter piping. Manhole access shall be provided. The new 24 inch sewer line shall then run approximately 300 feet west under Rio Road to connect with the CAWD sewer line at an existing manhole in Rio Road. The required sizing is subject to Mitigation Measure O-1 in Section 5.0, *Other CEQA Required Sections*.

Design of the new sewer connection shall be submitted to and approved by Monterey County RMA – Public Works and CAWD prior to issuance of grading permits. The new connection shall be installed prior to issuance of occupancy permits.

Significance After Mitigation. Implementation of Mitigation Measure U-2 would result in temporary construction impacts, since the installation of the required new sewer line beneath Val Verde Drive and Rio Road would require the operation of heavy equipment. This construction activity would result in increased emissions and potential noise and air quality impacts. However, the emissions associated with the implementation of Mitigation Measure U-2 are not expected to exceed and air quality thresholds or result in a cumulatively considerable net increase of any criteria pollutant. Construction activities would be limited to standard daytime hours and would comply with adopted noise standards. Finally, the new sewer line and manhole required by Mitigation Measure U-2 would be constructed entirely within the existing roadways of Val Verde Drive and Rio Road. Therefore, impacts related to agricultural resources, biological and cultural resources, and geology and soils would be less than significant. Because the sewer line would be constructed within existing rights-of-way, long-term effects of the required sewer line, such as aesthetics and drainage, would be less than significant.

Threshold 6:	*Not be served by a landfill with sufficient capacity to accommodate the projects solid waste disposal needs.*
Threshold 7:	*Not comply with federal, state and local statutes and regulations related to solid waste.*

Impact U-3 **The amount of solid waste that would be generated during construction and operation of the proposed project would not exceed the surplus capacity of the landfill serving the site. Impacts would be Class III, *less than significant*.**

The volume of waste generated by the residences within the proposed project was determined based on the CalRecycle solid waste generation rates, and is shown in Table 4.15-3. The most recently developed waste generation rate for single-family residential uses were selected for the proposed project.

Table 4.15-3
Projected Solid Waste Generation

Land Use	No. of Units	Generation Rates (pounds per unit per day) [a]	Daily Solid Waste (pounds per day)	Landfilled Solid Waste with Diversion (pounds per day) [b]
Single Family Residential	24	12.2	293.5	146.8
Multifamily	7	12.2	85.7	42.8
Total Increase (pounds/day)				**189.6**
Total Increase (tons/day)				**0.1**

[a] *CalRecycle, Estimated Solid Waste Generation Rates, website: http://www.calrecycle.ca.gov/wastechar/wastegenrates/, accessed 7/20/16.*
[b] *Assumes a 50% diversion rate, conservative estimate as the Monterey Peninsula Landfill achieves the state mandated 50% diversion. http://www.mrwmd.org/programs-services/recycling/ accessed 7/20/16.*

Table 4.15-3 shows the estimated amount of solid waste that would be generated by buildout of the proposed project. Prior to the consideration of any waste reduction efforts, the proposed project would generate a total of approximately 379 pounds (.19 tons) of solid waste per day. The analysis assumes a 50% reduction in solid waste generation by the Monterey Regional Waste Management District's (MRWMD) Materials Recovery Facility. This facility currently exceeds the state mandated 50% diversion rates for mixed waste. Assuming a 50% diversion rate, the proposed project would generate an estimated 189.56 pounds of solid waste per day, or 0.09 tons per day. All waste generated as a result of the proposed project development would be sent to the Monterey Peninsula Landfill, managed by the MRWMD. The Monterey Peninsula Landfill has a permitted peak tonnage of incoming waste or 3,500 tons per day, but currently receives less than 1,000 tons per day, or approximately 300,000 tons per year. The Monterey Peninsula Landfill also has a remaining landfill waste capacity of approximately 71 million cubic yards, or 48 million tons. At current rates, the facility has a life expectancy of 150 years (MRWMD, 2014). Therefore, the Monterey Peninsula Landfill has adequate capacity to accommodate waste generated from the project and impacts to solid waste would be less than significant.

Mitigation Measures. No mitigation is required.

Significance After Mitigation. Impacts would be less than significant.

c. Cumulative Impacts

Water. The analysis herein focuses on water-related infrastructure. Cumulative impacts to water supply are discussed in Section 4.8, *Hydrology and Water Quality.*

Because the project would be served by two existing on-site wells, the geographic extent for the analysis of cumulative impacts associated with water supply infrastructure is the project site itself. This geographic extent is appropriate because no other properties in the project vicinity would be served by the proposed on-site infrastructure. As discussed above, the project would provide the necessary water conveyance infrastructure to serve the site and proposed development, and the potential impacts associated with the construction of these facilities have

been analyzed throughout this EIR. The project's contribution to cumulative impacts related to the need for new or expanded water treatment facilities would therefore be less than significant.

Wastewater. The geographic extent for the analysis of cumulative wastewater impacts is the Carmel Valley. The western portion of the Carmel Valley, including the project site, is within the CAWD service area. Buildout of cumulative projects in the Carmel Valley will continue to increase demands on CAWD services. The CAWD currently has the capacity to accommodate up to 4.0 MGD, with approximately 2.7 MGD of existing available remaining capacity. Cumulative development within Carmel Valley is presented in Table 3-1 in Section 3.0, *Setting*. As shown therein, an additional 524 units, exclusive of the project, are proposed by other developments near the project site. However, residential units in the Valley would be capped at 190 units in accordance with CVMP Policy CV-1.6. Thus, not all development shown in Table 3-1 would be constructed without Board approval of an amendment to the CVMP. In addition, according to Monterey County, five of the 190 units have been constructed and 24 are reserved for an approved project (Schubert, 2016). Based on CAWD generation rates, the remaining 161 units would generate approximately 24,160 GPD of wastewater. This is well within the 1.5 MGD available capacity of the existing Plant. Thus, cumulative impacts would not be cumulatively considerable, and the project's contribution would be less than significant. It should also be noted that not all future development in Carmel Valley would be served by the CAWD. As such, the analysis presented herein is conservative.

Cumulative development would also increase the demand on the wastewater conveyance system. Each individual cumulative project in the service area would be required to install conveyance pipelines if such pipelines are not already available. The environmental effect of these facilities would be analyzed on a project-by-project basis. As discussed above, the project would require the installation of a new sewer line and manhole to connect to the existing CAWD sewer main. However, these conveyance improvements would take place within existing roadways. Therefore, the project's contribution to cumulative impacts associated with wastewater conveyance would be less than significant.

Solid Waste. The geographic extent for solid waste impacts is the area served by the Monterey Peninsula Landfill. Cumulative development in the service area would continue to increase solid waste generation. As discussed in Section 4.15.1(d) (Solid Waste) and under Impact U-3, the remaining landfill waste capacity is approximately 71 million cubic yards which is projected to last 150 years at present recycling and disposal rates (MRWMD, 2014). Given this available capacity, the proposed project, in combination with past, present, and reasonably foreseeable development within the landfill service area, would not be expected to exceed landfill capacity. Thus, cumulative impacts related to solid waste would not be cumulatively considerable, and the project's contribution would be less than significant. It should be noted that this assumes a current diversion rate of about 50%. Because all new development in the County would be required to participate in current and planned solid waste reduction programs, it is anticipated that the County would maintain, or even improve upon, this diversion rate. Thus, the analysis presented herein is conservative.

This page intentionally left blank.

4.16 EFFECTS FOUND NOT TO BE SIGNIFICANT

Section 15128 of the *State CEQA Guidelines* requires an EIR to briefly describe any possible significant effects that were determined not to be significant and were therefore not discussed in detail. This section addresses the potential environmental effects of the proposed project that were determined not be significant. The topics listed below that were found not to be significantly affected by the proposed project are drawn from the environmental checklist form included in Appendix G of the *State CEQA Guidelines*. Any items not addressed in this section are addressed in Section 4.0 of this EIR.

a. Scenic Highways. While Carmel Valley Road is designated as a key viewing corridor by Monterey County, it is not a state designated scenic highway. The project site is not visible from any State designated scenic highways. Therefore, no scenic resources within a State scenic highway would be damaged. There would be *no impact.*

b. Agriculture. The existing land use designation of the project site is Residential – Low Density (LD) 5 – 1 Acres/Unit with a zoning designation of Low Density Residential (max. one unit per acre), Design Control, Site Plan Review, and Residential Allocation Zoning (LDR/1-D-S-RAZ). The site is currently operated as agricultural row-crops with one single-family residence. As detailed in Section 4.6, *Geology and Soils*, the mapped soil type of the project site is Pico Fine Sandy Loam. Pico soils are found on floodplains and alluvial fans and have slow to medium runoff (USDA, 2003). Evaluation of the subsurface indicates that soils are generally dark brown slightly clayey silty fine sands. Reported soils types at the site consisted of sands with some local gravel zones (Buena Geotechnical Services, 2007). The project site is designated as Grazing Land on the Farmland Mapping and Monitoring Program (FMMP) Monterey County Important Farmland 2015/2016 map (California Department of Conservation, 2016). While the project site is currently operated as row crops, it is not designated as Prime Farmland, Farmland of Statewide Importance, or Unique Farmland, nor is the site zoned for agriculture or under a Williamson Act contract (California Department of Conservation, 2016). Therefore there would be *no impact* related to agriculture.

c. Forests. As detailed in Section 2.0, *Project Description*, the proposed project would require the removal of existing planted mixed woodland habitat, including Monterey cypress, Monterey pine, coast redwood, and box elder trees. However, no oak woodland or other protected tree species would be removed. As the project site is developed with row-crop agriculture, minimal trees would be removed. As the site is not zoned for forest land or timber land production, the proposed project would not conflict with existing zoning for, or cause rezoning of, forest land, timber land or conversion of forest land to non-forest use.

While the project would change the use of the project site from agriculture to residential, the land surrounding the project site is identified as Urban/Built-Up (California Department of Conservation, 2015) and there is no forest land near the project site.

As the project site is not designated as forest land, timber land, or Timberland Production, impacts to agriculture, forest, and timber land would be *less than significant.*

d. Riparian Habitat and Wetlands. The project site is operated as row crops and no sensitive vegetation communities are present on the project site (CDFW, 2010). As described in

Section 4.3, *Biological Resources,* the project site supports agricultural fields and planted mixed woodland vegetation, neither of which are naturally occurring. While the project site is located within the Carmel River watershed, no potential jurisdictional wetlands or non-wetland waters were identified on the project site and no riparian habitat is present. There would be *no impact.*

e. Wildlife Movement. As described in Section 4.3, *Biological Resources,* Rincon Biologists reviewed the CDFW BIOS (2015) and the *California Essential Habitat Connectivity Project: A Strategy for Conserving a Connected California* (Spencer et al., 2010) for information on wildlife corridors in the region. *Missing Linkages: Restoring Connectivity to the California Landscape and Critical Linkages: Bay Area & Beyond* (Penrod, et al., 2001 and 2013) identifies movement corridors throughout California, including specific details on corridors in Monterey County, and these reports was also reviewed for information on regional wildlife movement and known wildlife corridors. The fringe of an Essential Habitat Connectivity Area (ECA) is mapped within the eastern portion of the project site. ECAs represent principle connections between Natural Landscape Blocks. ECAs are regions in which land conservation and management actions should be prioritized to maintain and enhance ecological connectivity. ECAs are mapped based on coarse ecological condition indicators, rather than the needs of particular species and thus serve the majority of species in each region. The project site does not contain regional wildlife corridors. The planted mixed woodland habitat does include wildlife corridor characteristics, such as cover, but does not provide a link between natural habitats. In summary, the project does not contribute to the larger mapped ECA and does not provide a wildlife corridor in either a local or a regional context. Therefore, impacts related to wildlife movement as a result of the project would be *less than significant*.

f. Habitat Conservation Plans. The project site is not within an area subject to an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or State conservation plan. Therefore, there would be *no impact* related to conflicts with such a plan.

g. Fault Rupture. While the project site is located within the seismically active central California Coast Ranges geomorphic province, it is not located in an Alquist-Priolo Earthquake Fault Zone. There are no faults mapped on or adjacent to the project site (Earth Systems Pacific, 2010). There would be *no impact.*

h. Landslides. Landslides occur on unstable slopes. Because the project site is relatively flat, with a gradual topographic differential of 27.2 feet to 34.5 feet above mean sea level, the site is not subject to the hazard of landslides. There would be *no impact.*

i. Septic Tanks. Wastewater from the project site would be collected and conveyed through a conventional gravity system to an existing Carmel Area Wastewater District (CAWD) sanitary sewer located at the southwest corner of the site. As discussed in section 4.15, *Utilities*, the existing sewer has the capacity to serve the wastewater generated by the project. No septic tanks would be installed as part of the project. Therefore, there would be *no impact* related to septic tanks.

j. Hazardous Material Sites. The Cortese List includes hazardous waste facilities, contaminated drinking water wells, sites listed as having underground storage tank leaks that have discharged into surface water or groundwater, and other sites that have had a known

migration of hazardous materials or waste. A review of the Envirostor Hazardous Facility Database revealed that the proposed project site is not listed on the Cortese List, and furthermore that there are no known environmental sites of concern located within one mile of the project site. Therefore, the project site poses no risk of creating a hazard to personnel as a result of being located on a known site contaminated with hazardous materials. The project site and adjacent properties are not listed on the Cortese List of hazardous material sites compiled pursuant to Government Code Section 65963.6. Therefore, *no impacts* would occur.

k. Airport Hazards. The nearest airport to the project site is the Monterey Regional Airport, located four miles north of the project site. The project site is not located within the Airport Land Use Plan. The project would not result in a safety hazard related to airport operations. There would be *no impact.*

l. Emergency Response and Evacuation. The proposed project would not result in changes to the road structure but would involve the construction of an internal looped road with two entrances to Val Verde Drive, and therefore, would not result in any barriers to communication or access that would interfere with notification and warning systems, evacuation procedures or emergency response. Emergency vehicles from the nearest responding stations would access the site via Val Verde Drive. Residents evacuating the project site would use the nearest major evacuation routes, which would be Carmel Valley Road, approximately 0.6 driving mile from the project site, and Highway 1, approximately 0.5 mile from the project site. Therefore, implementation of the project would not interfere with Monterey County's Emergency Operations Plan, or any other relevant emergency plan. Compliance with local fire protection plans and policies, including the Monterey County General Plan Safety Element, Monterey County Hazard Mitigation Plan, and the Unit Strategic Fire Plan for San Benito-Monterey would further reduce the risk associated with wildfires. There would be *no impact.*

m. Runoff. The drainage facilities for the proposed project would be privately owned and maintained. The facilities would be sized to accommodate the proposed project and would not create or contribute to runoff water that would exceed the capacity of the existing or planned stormwater drainage systems. Additionally, the project would be required to comply with Monterey County Code Chapter 16.12, requiring runoff control to be implemented from a 10-year storm event (§16.12.070). All runoff must be detained or dispersed so that the runoff rate does not exceed the pre-development level. Impacts from runoff water would be *less than significant*.

n. Dam Inundation. The project site would not be subject to flooding as a result of the failure of a levee or dam. The Los Padres Dam is located over 20 miles to the southwest of the project site and the project site would not be subject to inundation in the event of failure of the Los Padres Dam. The San Clemente Dam, located approximately 13 miles upstream on the Carmel River, was recently removed. Therefore, there would be *no impact* related to dam failure.

o. Seiche, Tsunami, or Mudflow. A tsunami is a series of waves generated by an impulsive disturbance in the ocean or in a small, connected body of water produced when movement occurs on faults in the ocean floor. According to the Tsunami Inundation Map for Emergency Planning for the Monterey Quadrangle, a tsunami could inundate up to 0.6 mile

inland from the mouth of the Carmel River (Monterey County, 2015). The project site is located 1.4 miles inland from the shoreline and is not within the tsunami inundation zone.

A seiche is a wave in an enclosed body of water such as a lake or reservoir, produced from wind activity, changes in atmospheric pressure, and earthquakes. Because seiches inherently exist in enclosed bodies of water, only land adjacent to or within the bodies of water can be impacted. The project site is not located near any large inland water bodies and would not be subject to impacts from seiches. There would be *no impact.*

p. Conflict with a Habitat Conservation Plan. The project site is not located within the boundaries of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state conservation plan. Therefore, there would be *no impact* associated with conflicts with such a plan.

q. Mineral Resources. The project site is not mapped as containing important mineral resources in the Monterey County General Plan or the Carmel Valley Master Plan. The project site is not utilized for mineral extraction. Therefore, the proposed project would not result in the loss of availability of a known mineral resource and there would be *no impact* on mineral resources.

r. Airport Noise. The project site is located four miles south of the Monterey Regional Airport. The project site is not within an airport land use plan. As described in Section 4.10, *Noise*, the project site is not within the airport noise contours and residents and workers at the project site would not be exposed to excessive noise levels from airports or private airstrip operations. There would be *no impact.*

s. Air Traffic. The project site is located four miles from the Monterey Regional Airport and is not located within the Airport Land Use Plan. The project would not result in an increase of air traffic levels or a change in air traffic patterns.

t. Design Hazards and Emergency Access. The proposed project is compatible with nearby land uses and would not introduce new hazards due to design features or incompatible uses. The design of the project would be required to comply with the Monterey County Department of Public Works requirements and standards for safe access, including emergency vehicle access. While the project would introduce traffic associated with the residential use of the project site, increases in congestion and delay on the nearby street system would be unnoticeable and would not affect emergency access in the vicinity of the site (Julie Oates, 2016). There would be *no impact.*

u. Alternative Transportation. The project would include construction of pedestrian and bicycle facilities along the west side of Val Verde Drive and would not decrease the performance or safety of any such facilities. The project would not conflict with any policies, plans, or programs regarding public transit, or bicycle or pedestrian facilities (Julie Oates, 2016). There would be *no impact*.

5.0 OTHER CEQA REQUIRED SECTIONS

This section covers unique topics required to be addressed under the *State CEQA Guidelines* including growth-inducing effects, significant irreversible changes, and energy effects as set forth in *State CEQA Guidelines* Appendix F.

5.1 GROWTH-INDUCING EFFECTS

The *State CEQA Guidelines* require a discussion of a project's potential to foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment, including, among others, ways in which a project could remove an obstacle to growth.

Growth inducement itself is not an environmental effect but has the potential to lead to environmental effects. These environmental effects may include increased demand on other community and public services and infrastructure. Depending upon the type, magnitude, and location of growth, it can result in significant adverse environmental effects. The project's growth-inducing potential is therefore considered significant if it could result in significant physical effects in one or more environmental issue area.

A project can have the potential to induce direct and/or indirect growth. A project would directly induce growth by resulting in construction of new housing. It is important to note that direct forms of growth have secondary effects of expanding the size of local markets and attracting additional economic activity to the area. A project would indirectly induce growth by resulting in:

- Substantial new permanent employment opportunities, for example, commercial or industrial development;
- A construction effort with substantial short-term employment opportunities that indirectly stimulates the need for additional housing and services to support the new temporary employment demand; and/or
- Removal of an obstacle to additional growth and development, such as removing a constraint on a required public utility or service; for example, construction of a major sewer line with excess capacity through an undeveloped area.

Typically, the growth-inducing potential of a project would be considered significant if it fosters growth or a concentration of population above what is assumed in local and regional land use plans, or in projections made by regional planning authorities. Significant growth impacts could also occur if the project provides infrastructure or service capacity to accommodate growth levels beyond those permitted by local or regional plans and policies.

5.1.1 Economic and Population Growth

An analysis of the project's potential impact on population growth is provided in Section 4.11, *Population and Housing*. As discussed therein, the proposed project would add 31 new residential units to the County's housing stock and would generate approximately 69 to 102 additional residents, thus increasing the unincorporated County's population to 105,614 –

105,647. This would result in a less than 1% population increase to the Carmel-by-the-Sea Census County Division and/or the unincorporated area of the Monterey County. This level of growth falls within AMBAG and Monterey County General Plan growth projections. The CVMP Policy CV-1.6 limits new residential subdivisions in Carmel Valley to 190 units. Since adoption of this policy, five units have been constructed and 24 units are reserved, leaving a potential buildout of 161 additional units. The project itself would fall within the identified unit cap, and would therefore be consistent with this policy and would not result in unanticipated growth.

The proposed project includes residential development exclusively. As such, the proposed project would not directly contribute to economic growth by providing additional space for non-home businesses to operate. The proposed project would generate short-term employment opportunities during the construction phases, which would be expected to draw workers primarily from the available regional work force. The additional population accommodated by the project would provide an incremental contribution to the local economy as demand for general goods increases, which in turn could result in economic growth for various sectors. Newly housed residents would be expected to patronize commercial services in the area, but the scale of development would not be expected to generate a surge in retail or services demand that could not be accommodated by existing enterprises. Some of this additional demand is discussed further in Sections 4.12, *Public Services,* and 4.13, *Recreation.* In conclusion, the proposed project would not be expected to induce economic expansion to the extent that significant environmental impacts directly associated with the project's contribution would occur.

5.1.2 Removal of Obstacles to Growth

A physical obstacle to growth typically involves the lack of services or infrastructure. Similarly, the elimination or change in a regulatory obstacle, including existing growth and development policies, can result in new population growth.

Roadway Extensions/Improvements. The proposed project would have two access points along Val Verde Drive. Verde Drive is a private, two-lane unimproved road that runs north-south for approximately one-quarter mile north of the western portion of Rio Road. The project would involve widening this road to 34 feet and pave the length of the road from Rio Road to the northern property boundary. The access points to the project site would connect to make a continious loop. Therefore the access points would run east to west into the interior of the project site, where they would connect and run north to south. Since Val Verde Drive already exists – albeit in an unimproved state – the project would not provide new access to other undeveloped areas, or to remote areas. Therefore, the proposed project roadway network would not be considered growth-inducing.

As described in Section 4.14, *Transportation and Circulation,* transportation improvements planned in the Transportation Agency for Monterey County (TAMC) Regional Transportation Plan (RTP) would eliminate project impacts to some intersections and road segments. These improvements include: adding a second northbound through land on Highway 1 between Rio Road and Carmel Valley Road; improvements to the Highway 1/Rio Road Intersection; and improvements to the Highway 1/Carmel Valley Road intersection. Because these improvements are designed to improve existing traffic congestion, they are not part of the

proposed project and are not considered a growth-inducing effect of the project. No other off-site improvements are identifed as project-specific mitigation in Section 4.14, *Transportation and Circulation.*

Stormwater Infrastructure. Implementation of the proposed project would increase the amount of impervious surface area on the project site, thereby creating increased stormwater runoff that would require collection and discharge. Although the entire surface area of the project site would not be covered by impervious surfaces, the proposed project would generate new stormwater runoff in the area. Therefore, the proposed project would need to manage on-site stormwater. As described in Section 2.0, *Project Description,* the proposed project includes construction of an on-site retention/detention basin to manage stormwater. In addition, mitigation in Section 4.8, *Hydrology and Water Quality,* would require the implementation of stormwater control measures to maximize on-site infiltration of stormwater and minimize off-site stormwater discharge. These stormwater control measures would be designed such that post-development, off-site peak flow drainage from the project site would not be greater than pre-development peak flow drainage. On-site stormwater facilities would be sized to serve only the project stormwater runoff needs and would not be intended to serve other development outside the project site. Therefore, stormwater conveyance infrastructure and facilities to accommodate the project site would not be considered growth-inducing.

Wastewater Infrastructure. Implementation of the proposed project would not require expansion of the existing CAWD Water Pollution Control Plant, which would serve the proposed project, or construction of a new wastewater treatment facility, which would then accommodate additional growth. As described in Section 4.15, *Utilities and Service Systems,* the Plant has a remaining existing permitted capacity of approximately 1.5 million gallons per day (MGD) and the proposed project would generate approximately 0.00465 MGD, or less than 1% of the remaining existing capacity.

Wastewater generated by the proposed project would be collected and conveyed through a conventional gravity system of proposed 6-inch sanitary sewer pipes located within the proposed street right-of-ways, as shown in Figure 2-5 in Section 2.0, *Project Description*. The wastewater collected on-site would be conveyed to an existing 12-inch CAWD sanitary sewer main located at the southwest corner of the property within an existing 10-inch wide sewer easement.

As noted in Section 4.15, *Utilities and Service Systems,* the project applicant would be required to construct a new sewer line beneath Val Verde Drive and Rio Road to connect to existing CAWD facilities. Mitigation is required to ensure that this new sewer line is sized only to accommodate the proposed project, and it therefore would not be considered growth-inducing.

Water Infrastructure. The proposed project includes the provision of necessary water conveyance infrastructure to serve the proposed development, as described in Section 2.0, *Project Description*. A Community Water System (CWS), sourced from the existing Travers Well and Gamboa Replacement Well, would supply domestic and irrigation water for the project. On-site water infrastructure would include a 24-foot by 12-foot by 10-foot water treatment unit and two 4,500 gallon storage tanks, all located on the proposed inclusionary lot. The proposed on- site water lines would be sized to meet, but not exceed, the needs of the proposed project, and thus would not be considered growth-inducing. The proposed project does not involve

construction of any water infrastructure that would serve development outside of the project site. In addition, implementation of the proposed project would not require expansion of water infrastructure. The proposed project would not result in the development of excess water capacity to serve any other development, and therefore would not be considered growth-inducing.

Mitigation Measures. The following mitigation measure would limit the potential for the project to induce growth in the area, thereby reducing potentially significant physical effects associated with growth.

O-1 **New Sewer Line Capacity Limitations**. The new sewer line required by Mitigation Measure U-2 shall be sized to meet only the demands of the proposed project itself. The RMA – Public Works Department shall review plans for the proposed sewer line prior to approval of grading permits, and shall confirm that the infrastructure is appropriately sized consistent with this measure.

Significance After Mitigation. With the above measure, the potential to induce further growth would be reduced to a less than significant level.

5.2 SIGNIFICANT AND IRREVERSIBLE ENVIRONMENTAL EFFECTS

The environmental effects of the proposed project are discussed in Section 4 of this EIR and are summarized in the executive summary. Section 15126.2(c) of the *State CEQA Guidelines* requires a discussion of "significant irreversible environmental changes which would be caused by the proposed project should it be implemented. Uses of nonrenewable resources during the initial and continued phases of a project may be irreversible since a large commitment of such resources makes removal or nonuse thereafter unlikely. Primary impacts and, particularly, secondary impacts (e.g. a highway improvement which provides access to a previously inaccessible area) generally commit future generations to similar uses. Also irreversible damage can result from environmental accidents associated with a project. Irretrievable commitments of resources should be evaluated "to assure that such current consumption is justified." These three CEQA-required categories of irreversible changes – changes in land use that commit future generations, irreversible damage from environmental accidents, and large commitment of nonrenewable resources – are discussed below.

Changes in Land Use that Commit Future Generations. As described previously, the proposed project would result in the conversion of land currently used for agricultural and residential purposes to entirely residential use. However, the site is designated Residential – Low Density (LD) 5 – 1 Acres/Unit and is therefore planned for residential development under both the Monterey County General Plan and CVMP. As described in Section 4.9, *Land Use*, the proposed project would be potentially consistent with applicable policies of the Monterey County 2010 General Plan and the supplemental policies of the CVMP. While the project would result in the conversion of agricultural land, the project is generally consistent with the overall vision and policy direction of the General Plan. Nevertheless, the conversion of an actively farmed area to housing and supporting roadways and infrastructure would be considered an irreversible commitment of the land area away from agriculture.

Irreversible Damage from Environmental Accidents. Potential environmental accidents of concern include those that would have adverse effects on the environment or public health due to the nature or quantity of material released during an accident and the receptors exposed to that release. Construction activities associated with development of the proposed project would involve some risk for environmental accidents. However, these activities would be monitored by Monterey County, State, and federal agencies, and would follow professional industry standards and rigorous statutory requirements for safety and construction. As described in Section 4.7, *Hazards,* implementation of the proposed project would involve limited quantities of miscellaneous hazardous substances, such as gasoline, diesel fuel, and solvents. Considering the types and minimal quantities of hazardous materials that would be used for the proposed project, accidental releases are unlikely. Adherence to applicable federal, State, and local requirements would reduce damage to environmental accidents associated with the proposed project. As a result, the project would not pose a substantial risk of irreversible damage from environmental accidents.

Commitment of Nonrenewable Resources. Consumption of nonrenewable resources includes issues related to increased energy consumption, conversion of agricultural lands, and lost access to mining reserves. Construction and operation of the proposed project would irreversibly commit construction materials and non-renewable energy resources. These energy resource demands would be used for construction, heating and cooling of buildings, transportation of people and goods, as well as lighting and other associated energy needs. Non-renewable and slowly renewable resources used by the project would include, but are not limited to: lumber and other forest products; sand and gravel; asphalt; petrochemical construction materials; steel; copper; lead and other metals, water; electric and gas service.

Primary impacts related to consumption of non-renewable and slowly renewable resources are less than significant because the proposed project would not use unusual amounts of energy or construction materials, as development would be primarily comprised of common residential uses in accordance with all applicable laws and regulations, including those that focus on conservation efforts.

Similar to other typical residential projects of this nature, the commitment of limited, slowly renewable, and nonrenewable resources required for construction and operation of the proposed project would limit the availability of these resources for future generations or for other uses during the life of the project. Buildout of the project site would result in the significant irreversible commitment of land to urban uses and the long-term commitment of other renewable and nonrenewable resources. However, the project would be required to comply with all applicable building and design requirements, including those set forth in Title 24 relating to energy conservation. In compliance with CALGreen, the State's Green Building Standards Code, the project would be required to reduce water consumption by 20%, divert 50% of construction waste from landfills, and install low pollutant-emitting materials.

For the above reasons, the project would not result in any significant impacts as it relates to a large, irreversible commitment of nonrenewable resources.

5.3 ENERGY EFFECTS

The *State CEQA Guidelines* Appendix F requires that EIRs include a discussion of the potential energy consumption and/or conservation impacts of proposed projects, with particular emphasis on avoiding or reducing inefficient, wasteful, or unnecessary consumption of energy. As discussed previously, the proposed project would involve the use of energy during construction and operation of the residences and related infrastructure and improvements. Energy use during the construction phase would be in the form of fuel consumption to operate heavy equipment, light-duty vehicles, machinery, and generators for lighting. In addition, temporary grid power may also be provided to any temporary construction trailers or electric construction equipment.

All equipment used during the construction phase of the project would be required to comply with the regulations of Title 13, Chapter 9, of the California Code of Regulations pertaining to construction equipment specifications. The regulations of Title 13, Chapter 9, of the California Code of Regulations require that new and old construction equipment be properly tested, maintained, and operated to reduce air pollutant emissions. Compliance with Title 13 would not only reduce exhaust emissions, but would also improve the fuel economy of the equipment fleet. In addition, the project would be required to comply with Mitigation Measures N-1(a) and N-1(b in Section 4.10, *Noise,* of this EIR. Mitigation Measure N-1(a) requires that all construction equipment used for the project be properly maintained and all internal combustion engine driven machinery with intake and exhaust mufflers and engine shrouds, as applicable, shall be in good condition and appropriate for the equipment. Mitigation Measure N-1(b) requires that the construction vehicles and equipment used on the project site do not be left idling for longer than five minutes when not in use. Compliance with Title 13, as well as Mitigation Measure N-1(a) and N-1(b) would ensure that all construction equipment and activities associated with the project would not be inefficient, wasteful, or unnecessary with regard to energy consumption.

Long-term operation of the proposed project would require permanent grid connections for electricity and natural gas service to power internal and exterior residential lighting, appliances, and heating and cooling systems. In addition, the increase in vehicle trips associated with the project would increase fuel consumption within the County. The required water supply for the project would require electrical power as well. Based on CalEEMod default rates for energy use for proposed land uses on the project site, the operation of proposed uses would generate demand for an estimated 195,500 kilowatt hours (kWh) per year of electricity and 922,261 kilo British Thermal Units (kBTU) per year of natural gas. These default values for land uses are based on the California Commercial End Use Survey and Residential Appliance Saturation Survey studies, sponsored by the California Energy Commission, with adjustments to account for current Title 24 building codes (CAPCOA, 2013). CalEEMod considers energy use associated with major building envelope systems such as space heating and cooling, water heating, and ventilation; appliances and electronics; and lighting.

Gas and electric service for the proposed project would be provided by Pacific Gas and Electric Company (PG&E). PG&E's power mix consists of approximately 30% renewable energy sources, including approximately 11% large hydroelectric facilities and approximately 19% other renewable resources such as wind, geothermal, biomass, solar, and small hydroelectric.

As described previously, the proposed project would be subject to the energy conservation requirements of the Title 24 of the California Code of Regulations, known as the California Building Standards Code or Title 24, which requires numerous energy savings measures. In addition, the Conservation and Open Space Element of the County General Plan requires that development shall incorporate features that reduce energy used for transportation, including pedestrian and bicycle pathways, access to transit, and roadway design as appropriate and lots shall be oriented to maximize the energy gains from solar and/or wind resources in order to minimize energy losses where possible. Adherence to Title 24 and County energy conservation requirements as well as mitigation measures in this EIR would ensure that the increased energy that would be needed would not used in an inefficient, wasteful, or unnecessary manner.

This page intentionally left blank.

6.0 ALTERNATIVES

As required by Section 15126.6(a) of the State CEQA Guidelines, this EIR examines alternatives to the proposed project that could feasibly achieve most of the basic project objectives, but would avoid or substantially lessen the project's significant environmental effects.

In identifying suitable alternatives, potential alternatives must be reviewed to determine whether they:

- Can avoid or substantially reduce significant environmental effects;
- Can attain most of the basic project objectives;
- Are potentially feasible; and
- Are reasonable and realistic.

CEQA provides the following additional guidance for discussing project alternatives:

- An EIR need not consider every conceivable alternative to a project. Rather, it must consider a reasonable range of potentially feasible alternatives.
- An EIR is not required to consider alternatives that are infeasible. The term "feasible" means capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, technological and legal factors.
- The EIR must focus on alternatives to the project or its location that are capable of avoiding or substantially lessening any significant effects of the project.
- The alternatives discussed should be ones that offer substantial environmental advantages over the proposed project.
- The EIR should briefly describe the rationale for selecting the alternatives to be discussed, as well as any alternatives that the lead agency considered but rejected.
- The EIR shall include sufficient information about each alternative to allow meaningful evaluation, analysis and comparison with the proposed project.
- The alternatives analysis discussed must be reasonable, and selected to foster informed decision-making and public participation. An EIR need not consider an alternative where the effect cannot reasonably be ascertained or where the implementation is remote or speculative, because unrealistic alternatives do not contribute to a useful analysis.

Consistent with the above parameters, included in this analysis are the CEQA-required "No Project" alternatives, which include a No Project Alternative and three additional alternatives. The alternatives were selected for analysis because they are potentially feasible and may be able to reduce one or more of the significant adverse impacts associated with the proposed project. The alternatives are listed and summarized below, and subsequently discussed in greater detail within the impact analysis for each alternative:

- Alternative 1: No Project/No Development
- Alternative 2: No Project/Existing Zoning
- Alternative 3: Modified Subdivision
- Alternative 4: Reduced Density
- Alternative 5: Clustered Design

In conducting the alternatives analysis, as discussed previously, consideration must be given as to how, and to what extent, an alternative can meet the project's basic objectives. The objectives for the project, as listed in Section 2.0, *Project Description*, are as follows:

- Create a mix of market rate and affordable housing.
- Create an economically integrated infill project integrated with pedestrian and bike paths and walkways.
- Accommodate diverse modes of transportation
- Integrate energy-efficient home designs, optional solar power generation, and water conservation.
- Achieve objectives of the CVMP by implementing high-density housing.
- Position project as an infill development which can minimize extension of infrastructure and reduce travel in the Carmel Valley by providing housing adjacent to commercial uses.
- Provide a balance of housing supporting local needs with a mix of 25% inclusionary housing and the balance of market rate.

6.1 ALTERNATIVES CONSIDERED BUT REJECTED

The following alternatives were considered but eliminated from further discussion for the reasons given below.

Section 15126.6 of the State CEQA Guidelines states that:

> *"An EIR shall describe a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives. An EIR need not consider every conceivable alternative to a project. Rather it must consider a reasonable range of potentially feasible alternatives that will foster informed decision making and public participation. An EIR is not required to consider alternatives which are infeasible. ..The lead agency is responsible for selecting a range of project alternatives for examination and must publicly disclose its reasoning for selecting those alternatives. There is no ironclad rule governing the nature or scope of the alternatives to be discussed other than the rule of reason."*

Among the factors that may be used to eliminate alternatives from detailed consideration in an EIR are: (i) failure to meet most of the basic project objectives, (ii) infeasibility, or (iii) inability to avoid significant environmental impacts. Among the factors that may be taken into account when addressing the feasibility of alternatives are site suitability, economic viability, availability of infrastructure, general plan consistency, other plans or regulatory limitations, jurisdictional boundaries (projects with a regionally significant impact should consider the regional context), and whether the proponent can reasonably acquire, control or otherwise have access to the alternative site (or the site is already owned by the proponent). An EIR need not consider an alternative whose effect cannot be reasonably ascertained and whose implementation is remote and speculative.

Alternative Location. The California Supreme Court, in *Citizens of Goleta Valley v. Board of Supervisors* (1990), indicated that a discussion of alternative sites is needed if the project "may be feasibly accomplished in a successful manner considering the economic, environmental, social, and technological factors involved" at another site. Several criteria form the basis of whether alternative sites need to be considered in detail. These criteria take the form of the following questions:

1. Could the size and other characteristics of another site physically accommodate the project?
2. Is another site reasonably available for acquisition?
3. Is the timing of carrying out development on an alternative site reasonable for the applicant?
4. Is the project economically feasible on another site?
5. What are the land use designation(s) of alternative sites?
6. Does the lead agency have jurisdiction over alternative sites? and
7. Are there any social, technological, or other factors which may make the consideration of alternative sites infeasible?

Site characteristics that could support a project that meets the project objectives include: appropriate size to accommodate an economically viable residential subdivision; residential land use designation; and availability of appropriate urban services and characteristics, including relatively level terrain, available utilities, and location near local schools and commercial centers. Alternative sites designated for agricultural or open space use were rejected from consideration because development is not envisioned on these parcels under the Monterey County General Plan. While there are properties in Carmel Valley envisioned for residential development under the General Plan and Carmel Valley Master Plan (CVMP), the project applicant does not own an additional property that could accommodate 31 units as currently proposed.

6.2 ALTERNATIVE 1: NO PROJECT/NO DEVELOPMENT

6.2.1 Description

The No Project/No Development Alternative assumes that the proposed project is not pursued, and that the project site remains in its current state. The project site is located on an approximately 7.9-acre property, of which 6.6 acres are currently used for row crop agriculture producing strawberries, melons, artichokes, squash, pumpkins, fennel, fava beans, zucchini, radishes, and flowers. The remaining 1.3 acres, located at the southeast corner of the site, is developed with an existing single-family residence and a detached garage. The southeast corner of the site also contains planted mixed woodland habitat. This alternative assumes that these uses would continue.

6.2.2 Impacts

With the implementation of the No Project/No Development Alternative, the project site would remain in row crop agriculture and residential use, with a single-family residence and detached garage located at the southeast corner of the site. Since the proposed development would not

occur on the project site, impacts related to construction and long-term site disturbances, such as those relating to aesthetics, biological resources, cultural resources, hydrology and water quality, and geology and soils would not occur. Also, since no additional residents, employees or visitors would be brought onto the project site as a result of the proposed development, impacts based on a per capita generation would not occur under this alternative. These impact issues include air quality, climate change, noise, public services, recreation, transportation, and utilities. Because no development would occur, no additional property or occupants would be subject to geologic or other hazards such as flooding.

The current availability of and demand for water would not be changed and the discharge of stormwater associated with urban-related runoff would not occur in the absence of development. However, the existing runoff from crop irrigation would continue at their current levels. The continued production of irrigated crops on the project site may involve the use of agricultural chemicals such as fertilizers, herbicides, and pesticides, and associated impacts related to hazardous materials, water quality, and land use conflicts with the adjacent single-family uses to the north and south. However, the site currently produces organic agriculture. If this practice continues, such impacts would be limited.

Overall, while some environmental impacts would occur as a result of the continued use of the project site for agriculture, impacts resulting from the No Project/No Development Alternative would generally be less than for the proposed project. In summary, this alternative would avoid each of the significant and unavoidable impacts identified in this EIR. However, none of the project objectives would be achieved.

6.3 ALTERNATIVE 2: NO PROJECT/EXISTING ZONING

6.3.1 Alternative Description

The No Project/Existing Zoning Alternative assumes that the proposed project is not pursued, and that the project site is developed pursuant to existing zoning and lot configurations of the site. The approximately 7.9-acre project site is comprised of three legal parcels. Table 6-1 shows the parcel numbers, size, location, and use of each of the three existing parcels.

Table 6-1
Existing On-Site Parcels

APN	Size	Location	Use
015-021-020-000	1.3 acres	Southeast corner of the site	Single-family residence, detached garage
015-021-021-000	1.3 acres	Southwest corner of the site	Agricultural production
015-021-015-000	5.3 acres	Northern portion of the site	Agricultural production

This alternative assumes that the two agricultural parcels are developed with one single-family residence each, consistent with the existing zoning and lot configuration of the site. For the purposes of this analysis, it is assumed that the smaller parcel (APN 015-021-021-000) is converted from agricultural to residential use, but that the larger parcel (APN 015-021-015-000) continues predominantly in agricultural production. It is also assumed that the two new residences – for a total of three residences on-site – would each be served by new on-site wells

for water and on-site septic systems for wastewater disposal. No improvements to Val Verde Drive are assumed under this alternative.

6.3.2 Impacts

a. Aesthetics. This alternative would reduce buildout from a net increase of 30 residential units to a net increase of two residential units, equating to 28 fewer dwelling units. . Given the low density of this alternative, it is anticipated that most of the site would be retained in row crop agricultural and therefore retain its rural character. As such, this alternative would not materially alter the existing visual character of the project site, nor have a substantial adverse effect on a scenic vista. These impacts, which would be less than significant for the proposed project, would be reduced under this alternative, and would be therefore also be less than significant. No mitigation would be required.

Similarly, because this alternative would construct two new residences on the 7.9-acre project site, impacts related to light and glare would be substantially reduced when compared to the proposed project. Impacts would be reduced to a less than significant level, and no mitigation would be required.

b. Air Quality. As described in Section 4.2, *Air Quality,* the proposed project would result in less than significant impacts related to consistency with the Air Quality Management Plan (AQMP), construction-related emissions, operational emissions, CO hotspots, toxic air contaminants, and odors. Because this alternative would reduce on-site development by approximately 93%, it would further reduce these impacts compared to the proposed project. Impacts would be less than significant under both scenarios.

c. Biological Resources. Because this alternative would result in a substantially reduced housing development, it would result in far less site preparation and alteration than the proposed project. As a result, this alternative would be expected reduce impacts to special status animal species and nesting raptors and other avian species. These impacts, which would be significant but mitigable for the proposed project, would be anticipated to be less than significant under the No Project/Existing Zoning Alternative and no mitigation would be required. In addition, because no new development would occur on the existing developed parcel (APN 015-021-020-000), which contains some planted mixed woodland habitat, no tree removal would occur. Therefore, impacts related to conflicts with a tree preservation policy or ordinance – which would be less than significant for the proposed project – would be eliminated under this alternative.

d. Climate Change. The proposed project would result in less than significant impacts related to greenhouse gas (GHG) emissions. Because this alternative would reduce on-site development and resulting emissions by approximately 93%, GHG emissions would reduce commensurately – from an estimated 616 MT CO_2E per year to 43 MT CO_2E per year. As this is below the threshold of 1,150 MT CO_2e, impacts from this alternative would be less than significant.

As with the proposed project, this alternative would be required to comply with State regulations designed to achieve overall GHG reductions goals in AB 32 and other applicable

plans and policies related to GHG emissions. This alternative would not conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing GHG emissions, and impacts would be less than significant in this regard under both this alternative and the proposed project. Because this alternative would generate substantially fewer emissions, impacts related to compliance with State regulations would be reduced when compared to the proposed project.

e. Cultural Resources. Because this alternative would retain the existing on-site residence and associated detached garage, impacts related to removing this residence with respect to this environmental issue area would be eliminated. However, as discussed in Impact CR-1 in Section 4.5, *Cultural Resources,* neither the residence nor garage are considered an historical resource for the purposes of CEQA. There would be no impacts to historical resources as a result of this alternative, compared to less than significant impacts for the proposed project.

Because this alternative would reduce development potential by 93%, it would result in substantially less ground disturbance than the proposed project. As a result, this alternative would reduce impacts to unidentified archaeological resources, paleontological resources, and human remains. However, given that any site disturbance could potentially unearth or adversely impact previously unidentified archaeological resources or paleontological resources, potential impacts would remain significant but mitigable and Mitigation Measures CR-2 and CR-3 would continue to be required under this alternative. Compliance with existing regulations, including State Health and Safety Code Section 7050.5 and Public Resources Code Section 5097.98, would reduce impacts related to unearthing or adversely impacting previously unidentified human remains. These impacts would therefore be reduced and would be less than significant under this alternative, similar to the proposed project.

f. Geology and Soils. As described in Section 4.6, *Geology and Soils,* impacts related to seismically induced ground shaking, seismic related ground failure, erosion, and landslides would be less than significant under the proposed project. Because this alternative would construct far fewer structures and accommodate substantially fewer new residents on the project site, fewer people would be exposed to these hazards. For this reason, these impacts would all be reduced when compared to the proposed project in degree, although it is anticipated that compliance with applicable building codes would ensure impacts for the alternative are less than significant, similar to the proposed project.

g. Hazards. Because this alternative would substantially reduce development on the project site, activities related to the routine transport, use, or disposal of hazardous substances; risk of upset associated with roadway accidents; emission of hazardous materials within one-quarter mile of an existing school; and wildfires would be reduced when compared to the proposed project. In addition, because this alternative would retain the existing on-site residence and garage, impacts related to the potential for exposure to asbestos-containing materials and/or lead based paint resulting from demolition of these structures would be minimized. This impact would be less than significant for the proposed project as well as for this alternative.

Because this alternative would be developed over a substantially smaller portion of the project site, impacts related to exposure to residual pesticides and other agricultural chemicals in the

soil would be reduced. However, Mitigation Measure HAZ-3 would still be required to ensure that contamination from residual agricultural chemicals would be less than significant.

h. Hydrology and Water Quality. This alternative involves a substantial reduction in residential buildout, from 31 to three dwelling units. As a result, the development footprint would be reduced by approximately 93%. This reduction in building footprint would reduce the quantity of soil subject to erosion and would also reduce the area covered by impervious surfaces, resulting in a decrease in surface runoff and accelerated erosion. Impacts related to downstream sedimentation during construction, interference with groundwater recharge, increased stormwater runoff, and stormwater transport of pollutants and sediment would all be reduced when compared to the proposed project, and less than significant.

Due to the reduced level of buildout, this alternative would generate substantially less residential demand for groundwater. Based on the water demand factors used in the *Carmel Rio Road EIR – Groundwater Supply Technical Report* (Todd Groundwater, August 2016; Appendix G), two new on-site residences would generate demand for approximately 0.4 acre feet per year (AFY) of water.

Agricultural uses on the southwestern parcel (APN 015-021-021-000) would be eliminated, while agricultural uses on the northern parcel (APN 015-021-015-000) would continue. Assuming that baseline net consumptive groundwater use is applied to the agricultural portions of the site proportionally, the 1.3 acres of agriculture that would be eliminated by this project would demand an estimated 2.62 AFY. As such, the new residential demand under this alternative would be more than offset by the elimination of 1.3 acres of agriculture. Therefore, impacts would be reduced when compared to the proposed project, and would continue to be less than significant.

As shown in Figure 4.8-1 in Section 4.8, *Hydrology and Water Quality*, the lower southwestern portion of the site (APN 015-021-021-000) falls within the 100-year flood zone. If the new residence constructed on this parcel is sited to avoid this area, impacts associated with placing housing within a 100-year flood plain would be eliminated. If the residence is placed within the flood zone, mitigation to obtain a Conditional Letter of Map Revision – Fill would be required, similar to the proposed project. However, in total, this alternative could place a maximum of one unit in the flood zone, which would expose fewer residents to such hazards than the proposed project. Therefore, impacts would be reduced when compared to the project.

i. Land Use. This alternative would develop the site in accordance with existing zoning, and no Zoning Ordinance Amendments would be required. As described in Section 4.9, *Land Use,* the proposed project is generally consistent with applicable policies of the Monterey County 2010 General Plan and the supplemental policies of the CVMP. The No Project/Existing Zoning Alternative would also be consistent with applicable goals and policies of these planning documents, as development would occur in accordance with existing land use and zoning designations for the site. Impacts would similarly be significant but mitigable, upon implementation of any required mitigation measures. In addition, because this alternative would result in limited development on the site, it would not physically divide an established community, similar to the proposed project. This impact would be less than significant for both the project and this alternative.

j. Noise. This alternative would not result in demolition of the existing on-site residence and associated garage. Given this circumstance, construction-related noise impacts would be minimal and short-termed. In addition, it is anticipated that the rural residences would be distributed over the approximately 7.9-acre site, and likely would not be located immediately adjacent to the boundaries of the project site. Thus, this alternative would result in fewer impacts from construction-related noise, compared to significant but mitigable levels for the proposed project. Construction-related groundborne vibration impacts would also be reduced but would be less than significant in any event, similar to the proposed project.

As described in Section 4.10, *Noise,* project-generated traffic would have a less than significant impact on exterior and interior noise levels and impacts from the project would be less than significant. Because this alterative would reduce buildout and associated vehicle trips by 93%, such impacts would be commensurately reduced and would continue to be less than significant, similar to the proposed project. Operational noise from existing off-site activities and the proposed residences themselves would also be less than significant, similar to the proposed project.

k. Population and Housing. Based on the average persons per household shown in Table 4.11-4 in Section 4.11, *Population and Housing*, the No Project/Existing Zoning Alternative would generate up to an estimated seven residents, compared to 102 residents for the proposed project. Impacts related to inducing substantial population and housing growth – which would be less than significant for the proposed project – would therefore be reduced under this alternative.

Because this alternative would not result in demolition of the existing on-site residence, impacts related to displacement – which would be less than significant for the proposed project – would be eliminated under this alternative.

l. Public Services. This alternative would construct far fewer units in the same location as the proposed project and would therefore generate substantially less demand for public services. As such, impacts to fire protection and police protection services, schools, and library facilities would be the reduced when compared to the proposed project. Impacts would be less than significant, as they would be for the proposed project.

m. Recreation. As described in Section 4.13, *Recreation,* the proposed project would generate demand for parkland of up to 0.3 acre, which would be adequately met by existing County and regional parks. The No Project/Existing Zoning Alternative would reduce net buildout and reduce parkland demand commensurately – to an estimated 0.02 acre. As with the proposed project, this demand could be met by existing facilities, such that new facilities would not be required, and substantial physical deterioration of existing facilities would not occur. Impacts would be less than significant, similar to the proposed project.

n. Transportation and Circulation. This alternative would generate approximately 20 vehicle trips per day, with two trips generated during the AM peak hour and two trips generated during the PM peak hour. The proposed project would generate 285 total trips, with 22 trips in the AM peak hour and 30 trips generated in the PM peak hour, which would add

traffic to nearby intersections and road segments. Due to this alternative's substantially reduced density overall, this alternative would reduce total trips by approximately 93%.

As noted in Section 4.14, *Transportation and Circulation,* the proposed project would result in significant and unavoidable impacts under Existing plus Project, Background plus Project, and Cumulative plus Project conditions. This alternative's impacts to area intersections and roadways would be substantially reduced when compared to the proposed project, such that impacts to several segments and intersections may be reduced to a less than significant level. However, because several segments of and intersections with Highway 1 operate deficiently under existing conditions, any addition of trips to these areas would be considered a potentially significant impact. Thus, although this alternative would generate just two trips in the AM and PM peak hour, these trips would likely occur on Highway 1, and would therefore constitute a significant and unavoidable impact.

o. Utilities and Service Systems. This alternative would generate approximately 93% less wastewater per day than the proposed project – reducing generation from approximately 4,650 gallons per day to 300 gallons per day – and would dispose of wastewater in on-site septic systems. Therefore, impacts associated with wastewater conveyance infrastructure would be eliminated under this alternative. Septic systems would be designed and permitted to meet County standards, such that impacts related to septic disposal would not be expected.

This alternative would also generate substantially less solid waste than the proposed project. Because adequate landfill capacity is available for the project, adequate capacity would be available for the reduced solid waste associated with this alternative. Impacts would be reduced when compared to the proposed project, although it would be less than significant under both scenarios.

6.4 ALTERNATIVE 3: MODIFIED SUBDIVISION

6.4.1 Alternative Description

The Modified Subdivision Alternative assumes that the project site is subdivided and developed in accordance with the site's existing zoning designation. The current zoning designation for the site is *Low Density Residential*, which allows a maximum of one unit per acre. It also carries the following restrictions: *Design Control, Site Plan Review, and Residential Allocation Zoning (LDR/1-D-S-RAZ)*. This designation would allow subdividing the approximately 7.9-acre site into a total of seven lots, each approximately 1.13 acre in size. Each lot would be developed with one single-family residence. This alternative assumes that the existing on-site residence, located in the southeast portion of the site, would be demolished and replaced with a new residence. The buildout of seven units represents an 80% reduction in total net unit count compared to the proposed project.

General Plan Policy LU 2.13 requires that 25% of new housing units be affordable to very low, low, moderate, and workforce income households. In accordance with this requirement, the Existing Zoning Alternative would require 1.75 affordable units. To meet this requirement, it is assumed that one residence would be deed-restricted as affordable, and that the remaining

portion of the affordability requirement would be met through payment of fees, pursuant to Section 18.40.090(A) of the Monterey County Code.

Site access would be provided by Val Verde Drive to individual driveways. It is assumed that Val Verde Drive would not be improved under this alternative, and that up to seven new driveways would connect directly to Val Verde Drive to provide access to the new residences.

Due to the reduced level of density and given the minimum building site area, it is assumed that sewer service under this alternative would be provided by individual on-site septic systems. However, because the County encourages the use of local water systems over individual wells, it is assumed this alternative would be served by a Community Water System (CWS), sourced from existing on-site wells.

6.4.3 Impact Analysis

a. Aesthetics. This alternative would reduce buildout from a net increase of 30 residential units to a net increase of six residential units, an 80% decrease. While this alternative would convert the majority of the site from agricultural row crops to residential development, given the low density of this alternative, the site would retain a rural character. As such, this alternative would not significantly alter the existing visual character of the project site, nor have a substantial adverse effect on a scenic vista. These impacts, which would be less than significant for the proposed project, would be reduced under this alternative, and would be anticipated to be less than significant. No mitigation would be required.

Similarly, because this alternative would construct seven new residences on the 7.9-acre project site, impacts related to light and glare would be substantially reduced when compared to the proposed project. Impacts would be reduced to a less than significant level, and no mitigation would be required.

b. Air Quality. As described in Section 4.2, *Air Quality,* the proposed project would result in less than significant impacts related to consistency with the Air Quality Management Plan (AQMP), construction-related emissions, operational emissions, CO hotspots, toxic air contaminants, and odors. Because this alternative would reduce on-site development by approximately 80%, it would further reduce these impacts compared to the proposed project. Impacts would be less than significant under both scenarios.

c. Biological Resources. Because this alternative would reduce development potential by 80%, it would result in substantially less direct site disturbance than the proposed project. As a result, this alternative would reduce impacts to special status animal species and nesting raptors and other avian species. These impacts, which would be significant but mitigable for the proposed project, would be anticipated to be less than significant under the Modified Subdivision Alternative and no mitigation would be required. Because the existing on-site residence would be replaced, it is assumed that this alternative would remove some or all of the planted mixed woodland habitat in the vicinity of the existing residence, similar to the proposed project. Therefore, impacts related to conflicts with a tree preservation policy or ordinance – which would be less than significant for the proposed project – would be similar

under this alternative. Pursuant to receipt of a tree removal permit, impacts would be less than significant.

d. Climate Change. The proposed project would result in less than significant impacts related to GHG emissions. Because this alternative would reduce on-site development by approximately 80%, GHG emissions would reduce commensurately – from an estimated 616 MT CO_2E per year to 123 MT CO_2E per year. As this is below the threshold of 1,150 MT CO_2e, impacts from this alternative would be less than significant.

As with the proposed project, this alternative would be required to comply with State laws and regulations that are designed to achieve overall GHG reductions goals in AB 32 and other applicable plans and policies related to GHG emissions. This alternative would not conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing GHG emissions, and impacts would be less than significant in this regard under both this alternative and the proposed project.

e. Cultural Resources. Because this alternative would result in removal of the existing on-site residence and detached garage, similar to the proposed project, impacts related to removing this residence would still occur. As discussed in Impact CR-1 in Section 4.5, *Cultural Resources,* neither the residence nor garage are considered an historical resource for the purposes of CEQA. Therefore, impacts related to historical resources would be less than significant for both this alternative and the proposed project.

Because this alternative would reduce development potential by 80%, it would result in substantially less site disturbance than the proposed project. As a result, this alternative would reduce impacts to unidentified archaeological resources, paleontological resources, and unidentified human remains. However, given that any soil disturbance has a potential to unearth or adversely impact previously unidentified archaeological resources or paleontological resources, these impacts would continue to be significant but mitigable and Mitigation Measures CR-2 and CR-3 would continue to be required. Compliance with existing regulations, including State Health and Safety Code Section 7050.5 and Public Resources Code Section 5097.98, would reduce impacts related to unearthing or adversely impacting previously unidentified human remains. These impacts would therefore be less than significant under this alternative, similar to the proposed project.

f. Geology and Soils. As described in Section 4.6, *Geology and Soils,* impacts related to seismically induced ground shaking, seismic related ground failure, erosion, and landslides would be less than significant under the proposed project. Because this alternative would result in substantially fewer structures and house fewer residents at the project site, fewer people would be exposed to these hazards. For this reason, these impacts would all be reduced when compared to the proposed project in degree, although it is anticipated that compliance with applicable building codes would ensure impacts for the alternative are less than significant, similar to the proposed project.

g. Hazards. Because this alternative would reduce development on the project site by approximately 80%, impacts related to the routine transport, use, or disposal of hazardous substances; risk of upset associated with roadway accidents; emission of hazardous materials within one-quarter mile of an existing school; and wildfires would be reduced when compared

to the proposed project. However, these impacts would be less than significant for both the proposed project and this alternative.

This alternative would still result in the demolition of the existing on-site residence and garage, similar to the proposed project. Impacts related to the potential for exposure to asbestos-containing materials and/or lead based paint resulting from demolition of these structures would therefore be the same. Pursuant to compliance with existing regulations, this impact would be less than significant for the proposed project as well as for this alternative.

Because this alternative would require fewer construction personnel and accommodate fewer residents, impacts related to exposure to residual pesticides and other agricultural chemicals in the soil would be reduced. However, Mitigation Measure HAZ-3 would still be required to ensure that contamination from residual agricultural chemicals would be less than significant.

h. Hydrology and Water Quality. This alternative involves a substantial reduction in residential buildout, from 31 to seven dwelling units. This reduction in building footprint would reduce the quantity of soil subject to erosion and would also reduce the area covered by impervious surfaces, resulting in a decrease in surface runoff and accelerated erosion. Impacts related to downstream sedimentation during construction, interference with groundwater recharge, increased stormwater runoff, and stormwater transport of pollutants and sediment would all be reduced when compared to the proposed project, and less than significant.

Due to the reduced level of buildout, this alternative would generate substantially less demand for groundwater. Based on the water demand factors used in the *Carmel Rio Road EIR – Groundwater Supply Technical Report* (Todd Groundwater, August 2016; Appendix G), seven on-site residences would generate demand for approximately 1.4 AFY of water, compared to 6.8 AFY for the proposed project and 11.47 AFY under the baseline scenario (agriculture).

Although buildout and density would be substantially reduced, as with the proposed project, this alternative would result in the conversion of the site from agricultural to residential use, which would alter groundwater recharge and therefore change the net consumptive use of groundwater. The baseline net consumptive groundwater use of 5.9 AFY would be eliminated, and the project's net consumptive demand of approximately 3.2 AFY would be reduced. This alternative would therefore reduce net consumptive use of groundwater when compared to the proposed project. Impacts related to groundwater and water supply – which would be less than significant for the proposed project – would be reduced under this alternative.

As shown in Figure 4.8-1 in Section 4.8, *Hydrology and Water Quality*, the lower southwestern portion of the site (APN 015-021-021-000) falls within the 100-year flood zone. Because of the reduced level of buildout, this alternative may be able to avoid placing residences in this area. However, if one or more residences are placed within the flood zone, mitigation to obtain a Conditional Letter of Map Revision – Fill would be required, similar to the proposed project. However, in total, this alternative could place fewer units in the flood zone, which would expose fewer residents to such hazards than the proposed project. Therefore, impacts would be reduced when compared to the project.

i. Land Use. This alternative would subdivide and develop the site in accordance with the site's existing zoning designation, and would meet the affordability requirements by deed

restricting one unit as affordable and paying a fee to meet the remaining affordability requirement. As described in Section 4.9, *Land Use,* the proposed project is generally consistent with applicable policies of the Monterey County 2010 General Plan and the supplemental policies of the CVMP. The Modified Subdivision Alternative would also be consistent with applicable goals and policies of these planning documents, as development would occur in accordance with existing land use and zoning designations for the site. Impacts would similarly be significant but mitigable, upon implementation of any required mitigation measures. In addition, based on the presence of surrounding development and the overall reduced level of development on the site, this alternative would not physically divide an established community, similar to the proposed project. This impact would be less than significant for both the project and this alternative.

j. Noise. Given the decreased number of dwellings in this alternative, construction-related noise impacts would also be reduced. However, given that the entire 7.9-acre site would be subdivided into lots of approximately 1.13 acres each, some new lots would be created adjacent to existing residences to the north and south of the project site. Development of residences on each lot could potentially occur anywhere on the newly created lots, including as close as 50 feet from adjacent residences. Therefore, overall construction noise would reduce, but site-specific construction-related noise could reach as high as 89 dBA, similar to the proposed project. As such, Mitigation Measures N-1(a) through N-1(e) would continue to be required. As with the proposed project, these measures would reduce impacts to a less than significant level.

As described in Section 4.10, *Noise,* project-generated traffic would have a less than significant impact on exterior and interior noise levels and impacts from the project would be less than significant. Because this alterative would reduce buildout and associated vehicle trips by 80%, such impacts would be commensurately reduced and would continue to be less than significant, similar to the proposed project. Operational noise from existing off-site activities and the proposed residences themselves would also be less than significant, similar to the proposed project.

k. Population and Housing. Based on the average persons per household shown in Table 4.11-4 in Section 4.11, *Population and Housing*, the Modified Subdivision Alternative would generate up to an estimated 31 residents, compared to 102 residents for the proposed project. Impacts related to inducing substantial population and housing growth – which would be less than significant for the proposed project – would therefore be reduced under this alternative.

As with the proposed project, this alternative would remove the existing on-site residence, potentially displacing two to three people. However, seven residential units would be developed in its place, including one inclusionary unit, creating a net increase in the County's housing stock. Impacts related to displacement would therefore be less than significant, similar to the proposed project.

l. Public Services. This alternative would construct 80% fewer units in the same location as the proposed project and would therefore generate substantially less demand for public services. As such, impacts to fire protection and police protection services, schools, and library facilities would be the reduced when compared to the proposed project. Impacts would be less than significant, as they would be for the proposed project.

m. Recreation. As described in Section 4.13, *Recreation,* the proposed project would generate a parkland demand of up to 0.3 acre, which would be adequately met by existing County and regional parks. The Modified Subdivision Alternative would reduce net buildout by approximately 80% and reduce parkland demand commensurately – to an estimated 0.06 acre. As with the proposed project, this demand could be met by existing facilities, such that new facilities would not be required, and substantial physical deterioration of existing facilities would not occur. Impacts would be less than significant, similar to the proposed project.

n. Transportation and Circulation. This alternative would generate approximately 57 vehicle trips per day, with four trips generated during the AM peak hour and six trips generated during the PM peak hour. The proposed project would generate 285 total trips, with 22 trips in the AM peak hour and 30 trips generated in the PM peak hour, which would add traffic to nearby intersections and road segments. Due to this alternative's substantially reduced density overall, this alternative would reduce total trips by approximately 80%.

As noted in Section 4.14, *Transportation and Circulation,* the proposed project would result in significant and unavoidable impacts under Existing plus Project, Background plus Project, and Cumulative plus Project conditions. This alternative's impacts to area intersections and roadways would be substantially reduced when compared to the proposed project, such that impacts to several segments and intersections may be reduced to a less than significant level. However, because several segments of and intersections with Highway 1 operate deficiently under existing conditions, any addition of trips to these areas would be considered a potentially significant impact. Thus, although this alternative would generate just four trips in the AM peak hour and six trips in the PM peak hour, these trips would likely occur on Highway 1, and would therefore constitute a significant and unavoidable impact.

o. Utilities and Service Systems. This alternative would generate approximately 80% less wastewater per day than the proposed project – reducing generation from approximately 4,650 gallons per day to 1,050 gallons per day – and would dispose of wastewater in on-site septic systems. Therefore, impacts associated with wastewater conveyance infrastructure would be eliminated under this alternative. Septic systems would be designed and permitted to meet County standards, such that impacts related to septic disposal would not be expected.

This alternative would also generate substantially less solid waste than the proposed project. Because adequate landfill capacity is available for the project, adequate capacity would be available for the reduced solid waste associated with this alternative. Impacts would be reduced when compared to the proposed project, although it would be less than significant under both scenarios.

6.5 ALTERNATIVE 4: REDUCED DENSITY

6.5.1 Alternative Description

This alternative considers a reduced buildout of 19 units. This level of buildout would be achieved by subdividing the site into 16 lots, including 15 market-rate lots and one inclusionary lot. The inclusionary lot would be one acre in size and each of the market rate lots would be

approximately 0.46 acre. The buildout of 19 units represents an approximately 40% reduction in total unit count compared to the proposed project. Although buildout would be reduced, the entire site would be graded and developed under this alternative.

The site is subject to CVMP Policy CV-1.10, which allows up to four units per acre if at least 25% of the units are developed for individuals of low and moderate income or for workforce housing; this is also consistent with General Plan Policy 2.13, which requires 25% affordable housing for all new residential development. Consistent with these standards, the Reduced Density Alternative would require 4.75 affordable units. To meet this requirement, it is assumed that four residences would be deed restricted as affordable, and that the remaining portion of the affordability requirement would be met through payment of fees, pursuant to Section 18.40.090(A) of the Monterey County Code. The four affordable units would be constructed on the one-acre inclusionary lot.

CVMP Policy C-1.10 allows for a density of up to four units per acre. The inclusionary lot under this alternative would have a density of four units per acre, and the remainder of the site would have a density of 2.2 units per acre. Thus, this alternative would not require approval of a Zoning Ordinance Amendment to allow an exception to exceed this density for the purpose of affordable housing, as would the proposed project.

Similar to the proposed project, site access would be provided by one internal looped road with two entrances to Val Verde Drive. In addition, Val Verde Drive would be paved and widened from Rio Road to the northern property boundary, similar to the proposed project. It is also assumed that water would be provided through a Community Water System (CWS), sourced from existing on-site wells, and that sanitary sewer services would be provided by the Carmel Area Wastewater District (CAWD), similar to the proposed project.

6.5.2 Impact Analysis

a. Aesthetics. This alternative would reduce buildout from a net increase of 30 residential units to a net increase of 18 residential units, a 40% decrease. As with the proposed project, this alternative would convert the site from agricultural row crops to residential development, thus creating a more urban visual character. Because the overall density would be reduced under this alternative, this effect would be somewhat less than the proposed project. Impacts related to visual character and scenic vistas for both this alternative and the proposed project would be less than significant.

Because this alternative would construct 19 new residences on the 7.9-acre project site, it would introduce new sources of light and glare to the site, similar to the proposed project. Because buildout would be reduced, these impacts would be slightly reduced when compared to the proposed project; however, Mitigation Measure AES-3 would continue to be required.

b. Air Quality. As described in Section 4.2, *Air Quality,* the proposed project would result in less than significant impacts related to consistency with the AQMP, construction-related emissions, operational emissions, CO hotspots, toxic air contaminants, and odors. Because this alternative would reduce on-site development by approximately 40%, it would

further reduce these impacts compared to the proposed project. Impacts would be less than significant under both scenarios.

c. Biological Resources. Although this alternative would reduce development potential by 40%, it would result in the same amount of site disturbance as the proposed project. As a result, this alternative would result in similar impacts to special status animal species and nesting raptors and other avian species. These impacts would be significant but mitigable for the proposed project and this alternative, and Mitigation Measures B-1(a) through B-1(f) and B-2 would be required. Because the existing on-site residence would be replaced, it is assumed that this alternative would remove all of the planted mixed woodland habitat in the vicinity of the existing residence, similar to the proposed project. Therefore, impacts related to conflicts with a tree preservation policy or ordinance – which would be less than significant under the proposed project – would be similar under this alternative. Pursuant to receipt of a tree removal permit, impacts would be less than significant.

d. Climate Change. The proposed project would result in less than significant impacts related to GHG emissions. Because this alternative would reduce on-site development by approximately 40%, GHG emissions would reduce commensurately – from an estimated 616 MT CO_2E per year to 370 MT CO_2E per year. As this is below the threshold of 1,150 MT CO_2e, impacts from this alternative would be less than significant.

As with the proposed project, this alternative would be required to comply with State laws and regulations that are designed to achieve overall GHG reductions goals in AB 32 and other applicable plans and policies related to GHG emissions. This alternative would not conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing GHG emissions, and impacts would be less than significant in this regard under both this alternative and the proposed project.

e. Cultural Resources. Because this alternative would remove the existing on-site residence and associated detached garage, similar to the proposed project, impacts related to removing this residence would still occur. As discussed in Impact CR-1 in Section 4.5, *Cultural Resources,* neither the residence nor garage are considered an historical resource for the purposes of CEQA. Therefore, impacts related to historical resources would be less than significant for both this alternative and the proposed project.

Although this alternative would reduce development potential by 40%, it would result in the same amount of site disturbance as the proposed project. As a result, this alternative would result in similar impacts to previously unidentified archaeological resources, paleontological resources, and previously unidentified human remains. These impacts would be significant but mitigable for both this alternative and the proposed project, and Mitigation Measures CR-2 and CR-3 would be required. Compliance with existing regulations, including State Health and Safety Code Section 7050.5 and Public Resources Code Section 5097.98, would reduce impacts related to unearthing or adversely impacting previously unidentified human remains. These impacts would therefore be less than significant under this alternative, similar to the proposed project.

f. Geology and Soils. This alternative would reduce buildout from a net increase of 30 residential units to a net increase of 18 residential units, a 40% decrease. As described in Section

4.6, *Geology and Soils,* impacts related to seismically induced ground shaking, seismic related ground failure, erosion, and landslides would be less than significant under the proposed project. Because this alternative would construct fewer structures and generate fewer new residents on the project site, fewer people would be exposed to these hazards. For this reason, these impacts would all be reduced when compared to the proposed project in degree, although it is anticipated that compliance with applicable building codes would ensure impacts for the alternative are less than significant, similar to the proposed project.

g. Hazards. Because this alternative would reduce development on the project site by approximately 40%, impacts related to the routine transport, use, or disposal of hazardous substances; risk of upset associated with roadway accidents; emission of hazardous materials within one-quarter mile of an existing school; and wildfires would be reduced when compared to the proposed project. However, these impacts would be less than significant for both the proposed project and this alternative.

This alternative would demolish the existing on-site residence and garage, similar to the proposed project. Impacts related to the potential for exposure to asbestos-containing materials and/or lead based paint resulting from demolition of these structures would therefore be the same. Pursuant to compliance with existing regulations, this impact would be less than significant for the proposed project as well as for this alternative.

Because this alternative would require fewer construction personnel and generate fewer residents, impacts related to exposure to residual pesticides and other agricultural chemicals in the soil would be reduced. However, Mitigation Measure HAZ-3 would still be required to ensure that contamination from residual agricultural chemicals would be less than significant.

h. Hydrology and Water Quality. This alternative involves a reduction in residential buildout, from 31 to 19 dwelling units. While the entire site would be subdivided and developed, because of the reduced density, it is anticipated that this alternative would result in less soil disturbance and fewer impervious surfaces than the proposed project. Therefore, impacts related to downstream sedimentation during construction, interference with groundwater recharge, increased stormwater runoff, and stormwater transport of pollutants and sediment would all be reduced when compared to the proposed project. However, the construction of 19 units on the 7.9-acre site would still be expected to generate a potentially significant impact, mitigation outlined in Section 4.8, *Hydrology and Water Quality,* would be required to ensure that the amount and rate of on- and off-site stormwater runoff from this alternative would be reduced to the maximum extent feasible and that all stormwater runoff during construction and operation of the proposed project would be treated prior to discharge off-site to ensure that contaminated runoff does not enter the local stormwater drainage system or nearby waterbodies.

Due to the reduced level of buildout, this alternative would generate less demand for groundwater. Based on the water demand factors used in the *Carmel Rio Road EIR – Groundwater Supply Technical Report* (Todd Groundwater, August 2016; Appendix G), 19 on-site residences would generate demand for approximately 3.4 AFY of water, compared to 6.8 AFY for the proposed project and 11.47 AFY under the baseline scenario (agriculture).

Although buildout and density would be reduced, as with the proposed project, this alternative would result in the conversion of the site from agricultural to residential use, which would alter groundwater recharge and therefore change the net consumptive use of groundwater. As such, a baseline net consumptive groundwater use of 5.93 AFY would be eliminated, and the project's net consumptive demand of approximately 3.2 AFY would be reduced. This alternative would therefore reduce net consumptive use of groundwater when compared to the proposed project. Impacts related to groundwater and water supply – which would be less than significant for the proposed project – would be reduced under this alternative.

As shown in Figure 4.8-1 in Section 4.8, *Hydrology and Water Quality*, the lower southwestern portion of the site (APN 015-021-021-000) falls within the 100-year flood zone. As with the proposed project, this alternative would place housing within this area. Because fewer residents would be exposed to this hazard, impacts would be reduced; however, mitigation to obtain a Conditional Letter of Map Revision – Fill would still be required.

i. Land Use. This alternative would subdivide the site into 16 lots, including 15 market-rate lots and one inclusionary lot, and would meet the affordability requirements by deed restricting four units as affordable and paying a fee to meet the remaining affordability requirement. Because the density of the inclusionary lot would be four units per acre, a Zoning Ordinance Amendment would not be required.

As described in Section 4.9, *Land Use,* the proposed project is generally consistent with applicable policies of the Monterey County 2010 General Plan and the supplemental policies of the CVMP. The Reduced Density Alternative would also be consistent with applicable goals and policies of these planning documents, as development would occur in accordance with existing land use and zoning designations for the site. Impacts would similarly be significant but mitigable, upon implementation of any required mitigation measures. In addition, based on the presence of surrounding development and the overall reduced level of development on the site, this alternative would not physically divide an established community, similar to the proposed project. This impact would be less than significant for both the project and this alternative.

j. Noise. This alternative would reduce buildout from a net increase of 30 residential units to a net increase of 18 residential units, a 40% decrease. Given this decrease, construction-related noise impacts would be reduced. However, given that the entire 7.9-acre site would be subdivided and developed, new lots would be created adjacent to existing residences to the north and south of the project site. Development of residences on each lot could potentially occur anywhere on the newly created lots, including as close as 50 feet from adjacent residences. Therefore, overall construction noise would reduce, but site-specific construction-related noise could reach as high as 89 dBA, similar to the proposed project. As such, Mitigation Measures N-1(a) through N-1(e) would continue to be required. As with the proposed project, these measures would reduce impacts to a less than significant level.

As described in Section 4.10, *Noise,* project-generated traffic would have a less than significant impact on exterior and interior noise levels and impacts from the project would be less than significant. Because this alterative would reduce buildout and associated vehicle trips by 40%, such impacts would be commensurately reduced and would continue to be less than significant, similar to the proposed project. Operational noise from existing off-site activities and the

proposed residences themselves would also be less than significant, similar to the proposed project.

k. Population and Housing. Based on the average persons per household shown in Table 4.11-4 in Section 4.11, *Population and Housing*, the Reduced Density Alternative would generate up to an estimated 63 residents, compared to 102 residents for the proposed project. Impacts related to inducing substantial population and housing growth – which would be less than significant for the proposed project – would therefore be reduced under this alternative.

As with the proposed project, this alternative would remove the existing on-site residence, potentially displacing two to three people. However, 19 residential units would be developed in its place, including four inclusionary units, creating a net increase in the County's housing stock. Impacts related to displacement would therefore be less than significant, similar to the proposed project.

l. Public Services. This alternative would construct 40% fewer units in the same location as the proposed project and would therefore generate less demand for public services. As such, impacts to fire protection and police protection services, schools, and library facilities would be the reduced when compared to the proposed project. Impacts would be less than significant, as they would be for the proposed project.

m. Recreation. As described in Section 4.13, *Recreation,* the proposed project would generate a parkland demand of up to 0.3 acre, which would be adequately met by existing County and regional parks. The Reduced Density Alternative would reduce net buildout by approximately 40% and reduce parkland demand commensurately – to an estimated 0.18 acre. As with the proposed project, this demand could be met by existing facilities, such that new facilities would not be required, and substantial physical deterioration of existing facilities would not occur. Impacts would be less than significant, similar to the proposed project.

n. Transportation and Circulation. This alternative would generate approximately 171 vehicle trips per day, with 13 trips generated during the AM peak hour and 18 trips generated during the PM peak hour. The proposed project would generate 285 total trips, with 22 trips in the AM peak hour and 30 trips generated in the PM peak hour, which would add traffic to nearby intersections and road segments. Due to this alternative's substantially reduced density overall, this alternative would reduce total trips by approximately 40%.

As noted in Section 4.14, *Transportation and Circulation,* the proposed project would result in significant and unavoidable impacts under Existing plus Project, Background plus Project, and Cumulative plus Project conditions. This alternative's impacts to area intersections and roadways would be reduced when compared to the proposed project. However, because several segments of and intersections with Highway 1 operate deficiently under existing conditions, any addition of trips to these areas would be considered a potentially significant impact. Thus, although this alternative would generate 40% fewer trips than the proposed project, these trips would likely occur on Highway 1, and would therefore constitute a significant and unavoidable impact. Impacts to other study area intersections and roadway segments would also be anticipated to be significant and unavoidable, similar to the proposed project.

o. Utilities and Service Systems. This alternative would generate approximately 40% less wastewater per day than the proposed project – reducing generation from approximately 4,650 gallons per day to 2,850 gallons per day. As with the proposed project, wastewater would be sent to the CAWD Water Pollution Control Plant. As noted in Section 4.15, *Utilities and Service Systems,* the project's wastewater could be accommodated within existing CAWD treatment facilities, and these facilities meet wastewater treatment requirements of the Central Coast RWQCB. Because the project would reduce the amount of waste entering this existing facility, impacts would be reduced when compared to the proposed project, although it would be less than significant under both scenarios.

This alternative would also generate less solid waste than the proposed project. Because adequate landfill capacity is available for the project, adequate capacity would be available for the reduced solid waste associated with this alternative. Impacts would be reduced when compared to the proposed project, although it would be less than significant under both scenarios.

6.6 ALTERNATIVE 5: CLUSTERED DESIGN

6.6.1 Alternative Description

This alternative would include the development of 15 units clustered in the southern portion of the site. The units would be sited on APNs 015-021-020-000 and 015-021-021-000, which are both approximately 1.3 acres and are located in the southeastern and southwestern portions of the site, respectively. Thus, the 15 units would be located in the southern portion of the site on approximately 2.6 acres. This represents approximately one-third of the project site, consistent with CVMP Policy CV-6.3(c). APN 015-021-015-000, which totals approximately 5.3 acres in the northern portion of the site, would remain in agricultural use under this alternative.

Consistent with General Plan Policy 2.13, which requires 25% affordable housing for all new residential development, the Clustered Design Alternative would require 3.75 affordable units. To meet this requirement, it is assumed that three residences would be deed restricted as affordable, and that the remaining portion of the affordability requirement would be met through payment of fees, pursuant to Section 18.40.090(A) of the Monterey County Code. The four affordable units would be constructed on the one-acre inclusionary lot.

Site access would be provided by one cul-de-sac road with an entrance to Val Verde Drive. In addition, Val Verde Drive would be paved and widened from Rio Road to the northern boundary of APN 015-021-020-000, which represents the northern edge of the alternative development. It is also assumed that water would be provided through a CWS, sourced from existing on-site wells, and that sanitary sewer services would be provided by CAWD, similar to the proposed project.

6.6.2 Impact Analysis

a. Aesthetics. This alternative would reduce buildout from a net increase of 30 residential units to a net increase of 14 residential units, a 53% decrease. The units would be clustered in the southern 2.6 acres of the site, leaving the northern 5.3 acres in agricultural

production. Because this alternative would leave the majority of the site in agriculture, brief views of the project site from Carmel Valley Road would likely be agricultural rather than residential. As noted in Section 4.1, *Aesthetics,* the proposed project would not hinder vistas of the Carmel River or the distant hills within this narrow viewing corridor. As such, while impacts would be reduced, they would be less than significant under both scenarios. The site would also retain more of its rural character under this alternative. Impacts to scenic character and quality – which would be less than significant for the proposed project – would be reduced under this alternative, and would be anticipated to be less than significant. No mitigation would be required.

Because this alternative would construct 15 new residences on the 7.9-acre project site, it would introduce new sources of light and glare to the site, similar to the proposed project. Because buildout would be reduced, these impacts would be slightly reduced when compared to the proposed project; however, Mitigation Measure AES-3 would continue to be required.

b. Air Quality. As described in Section 4.2, *Air Quality,* the proposed project would result in less than significant impacts related to consistency with the Air Quality Management Plan (AQMP), construction-related emissions, operational emissions, CO hotspots, toxic air contaminants, and odors. Because this alternative would reduce on-site development by approximately 53%, it would further reduce these impacts compared to the proposed project. Impacts would be less than significant under both scenarios.

c. Biological Resources. This alternative would concentrate development on 2.6 acres, or 33% of the 7.9-acre site. As such, it would result in 66% less site disturbance than the proposed project. However, this alternative would remove the planted mixed woodland habitat in the southeastern portion of the site, similar to the proposed project. Because on-site habitat for special status species and nesting birds occurs primarily within the planted mixed woodland habitat, impacts would be similar and Mitigation Measures B-1(a) through B-1(f) and B-2 would be required.

Because the existing on-site residence would be replaced, it is assumed that this alternative would remove all of the planted mixed woodland habitat in the vicinity of the existing residence, similar to the proposed project. Therefore, impacts related to conflicts with a tree preservation policy or ordinance – which would be less than significant for the proposed project – would be similar under this alternative. Pursuant to receipt of a tree removal permit, impacts would be less than significant.

d. Climate Change. The proposed project would result in less than significant impacts related to GHG emissions. Because this alternative would reduce on-site development by approximately 53%, GHG emissions would reduce commensurately – from an estimated 616 MT CO_2E per year to 290 MT CO_2E per year. As this is below the threshold of 1,150 MT CO_2e, impacts from this alternative would be less than significant.

As with the proposed project, this alternative would be required to comply with State laws and regulations that are designed to achieve overall GHG reductions goals in AB 32 and other applicable plans and policies related to GHG emissions. This alternative would not conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing GHG emissions,

and impacts would be less than significant in this regard under both this alternative and the proposed project.

e. Cultural Resources. Because this alternative would remove the existing on-site residence and associated detached garage, similar to the proposed project, impacts related to removing this residence would still occur. As discussed in Impact CR-1 in Section 4.5, *Cultural Resources,* neither the residence nor garage are considered an historical resource for the purposes of CEQA. Therefore, impacts related to historical resources would be less than significant for both this alternative and the proposed project.

Because this alternative would concentrate development on the southern 33% of the site, it would result in substantially less site disturbance than the proposed project. As a result, this alternative would reduce impacts to previously unidentified archaeological resources, paleontological resources, and previously unidentified human remains. However, given that any site disturbance could potentially unearth or adversely impact previously unidentified archaeological resources or paleontological resources, these impacts would continue to be significant but mitigable and Mitigation Measures CR-2 and CR-3 would continue to be required under this alternative as well as the project. Compliance with existing regulations, including State Health and Safety Code Section 7050.5 and Public Resources Code Section 5097.98, would reduce impacts related to unearthing or adversely impacting previously unidentified human remains. These impacts would therefore be less than significant under this alternative, similar to the proposed project.

f. Geology and Soils. This alternative would reduce buildout from a net increase of 30 residential units to a net increase of 14 residential units, a 53% decrease. As described in Section 4.6, *Geology and Soils,* impacts related to seismically-induced ground shaking, seismic related ground failure, erosion, and landslides would be less than significant under the proposed project. Because this alternative would construct fewer structures and generate fewer new residents on the project site, fewer people would be exposed to these hazards. For this reason, these impacts would all be reduced when compared to the proposed project in degree, although it is anticipated that compliance with applicable building codes would ensure impacts for the alternative are less than significant, similar to the proposed project.

g. Hazards. Because this alternative would reduce development on the project site by approximately 53%, impacts related to the routine transport, use, or disposal of hazardous substances; risk of upset associated with roadway accidents; emission of hazardous materials within one-quarter mile of an existing school; and wildfires would be reduced when compared to the proposed project. However, these impacts would be less than significant for both the proposed project and this alternative.

This alternative would demolish the existing on-site residence and garage, similar to the proposed project. Impacts related to the potential for exposure to asbestos-containing materials and/or lead based paint resulting from demolition of these structures would therefore be the same. Pursuant to compliance with existing regulations, this impact would be less than significant for the proposed project as well as for this alternative.

This alternative would require fewer construction personnel and generate fewer residents, and would leave the northern 5.3 acres of the site in agricultural production. Impacts related to

exposure to residual pesticides and other agricultural chemicals in the soil would therefore be reduced. However, Mitigation Measure HAZ-3 would still be required to ensure that contamination from residual agricultural chemicals in the southwestern 1.3-acres of the site would be less than significant.

h. Hydrology and Water Quality. This alternative involves a reduction in residential buildout, from 31 to 15 dwelling units. Because development would be clustered in the southern portion of the site, this alternative would result in less soil disturbance and fewer impervious surfaces than the proposed project. Therefore, impacts related to downstream sedimentation during construction, interference with groundwater recharge, increased stormwater runoff, and stormwater transport of pollutants and sediment would all be reduced when compared to the proposed project. However, mitigation identified in Section 4.8, *Hydrology and Water Quality,* may still be required to ensure that the amount and rate of on- and off-site stormwater runoff from this alternative would be reduced to the maximum extent feasible and that all stormwater runoff during construction and operation of the proposed project would be treated prior to discharge off-site to ensure that contaminated runoff does not enter the local stormwater drainage system or nearby waterbodies.

Due to the reduced level of buildout, this alternative would generate less demand for groundwater. Based on the water demand factors used in the *Carmel Rio Road EIR – Groundwater Supply Technical Report* (Todd Groundwater, August 2016; Appendix G), 15 on-site residences would generate demand for approximately 2.7 AFY of water, compared to 6.8 AFY for the proposed project and 11.47 AFY under the baseline scenario (agriculture).

Agricultural uses on the southwestern parcel (APN 015-021-021-000; 1.3 acres) would be eliminated, while agricultural uses on the northern parcel (APN 015-021-015-000; 5.3 acres) would continue. Because some agriculture would continue, this alternative would allow for more groundwater recharge than the proposed project. However, it would also continue to demand up to 9.2 AFY of water for agriculture, while adding water demand for 15 residential units, estimated at 2.7 AFY.[1] Groundwater pumping may therefore increase from 11.47 AFY under baseline conditions to 11.9 AFY under the Clustered Design Alternative. These figures reflect pumping demand only and do not account for groundwater recharge, which is factored into net consumptive use. Recharge would continue consistent with current conditions for the northern 5.3 acres that would remain in agriculture, but would be altered for the southern 2.6 acres. The net consumptive use for this alternative may therefore be equal to or greater than the proposed project, which would be a potentially significant impact to groundwater resources. This impact would therefore be greater under this alternative than under the proposed project.

As shown in Figure 4.8-1 in Section 4.8, *Hydrology and Water Quality*, the lower southwestern portion of the site (APN 015-021-021-000) falls within the 100-year flood zone. As with the

[1] The calculation for agricultural demand assumes that baseline agricultural demand of approximately 11.47 AFY is applied uniformly to the 6.6 acres of the site currently in agricultural production, which would result in an estimated 1.74 AFY water demand per acre. Thus, the 5.3 acres continuing in agriculture would demand approximately 9.2 AFY (1.74 AFY x 5.3 acres). The estimated residential demand is based on demand factors used in the *Carmel Rio Road EIR – Groundwater Supply Technical Report* (Todd Groundwater, August 2016; Appendix G), utilizing the single family rate for 12 units, the "Inclusionary type 1" rate for two units, and the "Inclusionary type 2" rate for one unit.

proposed project, this alternative would place housing within this area. Because fewer residents would be exposed to this hazard, impacts would be reduced; however, mitigation to obtain a Conditional Letter of Map Revision – Fill would still be required.

i. Land Use. This alternative would include the development of 15 units clustered in the southern portion of the site. The units would be sited on APNs 015-021-020-000 and 015-021-021-000, which are both approximately 1.3 acres and are located in the southeastern and southwestern portions of the site, respectively. Thus, the 15 units would be located in the southern portion of the site on approximately 2.6 acres. This represents approximately one-third of the project site, consistent with CVMP Policy CV-6.3(c).

As described in Section 4.9, *Land Use,* the proposed project is generally consistent with applicable policies of the Monterey County 2010 General Plan and the supplemental policies of the CVMP. The Clustered Design Alternative would also be consistent with applicable goals and policies of these planning documents, as development would occur in accordance with CVMP Policy CV-6.3(c). It should be noted, however, that because this alternative would result in a density of approximately 5.8 units per acre, a variance or Zoning Ordinance Amendment would be required to allow an exception to exceed the allowable density on the site. Pursuant to approval of such a variance or amendment, impacts would similarly be significant but mitigable, upon implementation of any required mitigation measures. In addition, based on the presence of surrounding development and the overall reduced level of development on the site, this alternative would not physically divide an established community, similar to the proposed project. This impact would be less than significant for both the project and this alternative.

j. Noise. This alternative would reduce buildout from a net increase of 30 residential units to a net increase of 14 residential units, a 53% decrease. Given this decrease, construction-related noise impacts would be reduced. Because development would be concentrated in the southern portion of the site, impacts to existing residences north of the site would be reduced to a less than significant level. However, construction would still occur as close as 50 feet from adjacent residences to the south of the project site. Therefore, overall construction noise would reduce, but site-specific construction-related noise could reach as high as 89 dBA, similar to the proposed project. As such, Mitigation Measures N-1(a) through N-1(e) would continue to be required. As with the proposed project, these measures would reduce impacts to a less than significant level.

As described in Section 4.10, *Noise,* project-generated traffic would have a less than significant impact on exterior and interior noise levels and impacts from the project would be less than significant. Because this alterative would reduce buildout and associated vehicle trips by 53%, such impacts would be commensurately reduced and would continue to be less than significant, similar to the proposed project. Operational noise from existing off-site activities and the proposed residences themselves would also be less than significant, similar to the proposed project.

k. Population and Housing. Based on the average persons per household shown in Table 4.11-4 in Section 4.11, *Population and Housing*, the Clustered Design Alternative would generate up to an estimated 50 residents, compared to 102 residents for the proposed project.

Impacts related to inducing substantial population and housing growth – which would be less than significant for the proposed project – would therefore be reduced under this alternative.

As with the proposed project, this alternative would remove the existing on-site residence, potentially displacing two to three people. However, 15 residential units would be developed in its place, including three inclusionary units, creating a net increase in the County's housing stock. Impacts related to displacement would therefore be less than significant, similar to the proposed project.

l. Public Services. This alternative would construct 53% fewer units in the same location as the proposed project and would therefore generate substantially less demand for public services. As such, impacts to fire protection and police protection services, schools, and library facilities would be the reduced when compared to the proposed project. Impacts would be less than significant, as they would be for the proposed project.

m. Recreation. As described in Section 4.13, *Recreation,* the proposed project would generate a parkland demand of up to 0.3 acre, which would be adequately met by existing County and regional parks. The Clustered Design Alternative would reduce net buildout by approximately 53% and reduce parkland demand commensurately – to an estimated 0.14 acre. As with the proposed project, this demand could be met by existing facilities, such that new facilities would not be required, and substantial physical deterioration of existing facilities would not occur. Impacts would be less than significant, similar to the proposed project.

n. Transportation and Circulation. This alternative would generate approximately 134 vehicle trips per day, with 10 trips generated during the AM peak hour and 14 trips generated during the PM peak hour. The proposed project would generate 285 total trips, with 22 trips in the AM peak hour and 30 trips generated in the PM peak hour, which would add traffic to nearby intersections and road segments. Due to this alternative's substantially reduced density overall, this alternative would reduce total trips by approximately 53%.

As noted in Section 4.14, *Transportation and Circulation,* the proposed project would result in significant and unavoidable impacts under Existing plus Project, Background plus Project, and Cumulative plus Project conditions. This alternative's impacts to area intersections and roadways would be reduced when compared to the proposed project. However, because several segments of and intersections with Highway 1 operate deficiently under existing conditions, any addition of trips to these areas would be considered a potentially significant impact. Thus, although this alternative would generate 40% fewer trips than the proposed project, these trips would likely occur on Highway 1, and would therefore constitute a significant and unavoidable impact. Impacts to other study area intersections and roadway segments would also be anticipated to be significant and unavoidable, similar to the proposed project.

o. Utilities and Service Systems. This alternative would generate approximately 53% less wastewater per day than the proposed project – reducing generation from approximately 4,650 gallons per day to 2,250 gallons per day. As with the proposed project, wastewater would be sent to the CAWD Water Pollution Control Plant. As noted in Section 4.15, *Utilities and Service Systems,* the project's wastewater could be accommodated within existing CAWD

treatment facilities, and these facilities meet wastewater treatment requirements of the Central Coast RWQCB. Because the project would reduce the amount of waste entering this existing facility, impacts would be reduced when compared to the proposed project, although it would be less than significant under both scenarios.

This alternative would also generate less solid waste than the proposed project. Because adequate landfill capacity is available for the project, adequate capacity would be available for the reduced solid waste associated with this alternative. Impacts would be reduced when compared to the proposed project, although it would be less than significant under both scenarios.

6.7 ENVIRONMENTALLY SUPERIOR ALTERNATIVE

CEQA requires the identification of the environmentally superior alternative among the options studied. When the "no project" alternative is determined to be environmentally superior, CEQA also requires identification of the environmentally superior alternative among the development options.

Table 6-2 indicates whether each alternative's environmental impact is greater, lesser, or similar to the proposed project. As shown therein, all five alternatives would reduce most impacts compared to the proposed project, with the No Project/No Development and No Project/Existing Zoning Alternatives reducing impacts to the greatest extent. Both can therefore be considered environmentally superior to the proposed project. Impacts would be eliminated or reduced primarily due to the lack of development and maintenance of the existing condition in the case of the No Project/No Development Alternative, and the significant reduction in buildout potential in the case of the No Project/Existing Zoning Alternative. However, neither of these alternatives would meet any of the project objectives. For example, the No Project/No Development Alternative would not create a mix of market rate and affordable housing, create an economically integrated infill project integrated with pedestrian and bike paths and walkways, or achieve objectives of the CVMP by implementing high-density housing. While the No Project/Existing Zoning Alternative would add two new market rate units, it would similarly not create a mix of housing, nor development higher density housing with pedestrian and bike connections. This alternative also would not eliminate the project's significant and unavoidable traffic-related impacts to Highway 1.

The Modified Subdivision Alternative and Clustered Design Alternative would both also reduce most impacts associated with the proposed project, due to the reduced level of buildout – seven units for Modified Subdivision and 15 units for Clustered Design Alternative. Because both alternatives would substantially reduce buildout, they would reduce impacts associated with population generation, including: air quality, climate change, noise, public services, recreation, transportation, and utilities. Because the Modified Subdivision Alternative would result in fewer units than the Clustered Design Alternative, these impacts would be reduced to a greater extent under the Modified Subdivision Alternative.

Because the Clustered Design Alternative would concentrate development on one third of the site, it would not only reduce buildout but would also substantially reduce overall site disturbance. As shown in Table 6-2, because this alternative would retain approximately 66% of

the site in agricultural production, it would reduce impacts associated with site disturbance, including: aesthetics, cultural resources, and geology and soils. It should be noted that, because this alternative would still disturb the on-site planted mixed woodland habitat, impacts to biological resources would be similar to the proposed project, despite the reduced footprint. In addition, impacts related to groundwater supply may be worse under the Clustered Design Alternative when compared to the proposed project. Thus, because the Clustered Design Alternative would generate biological and water supply impacts equal to or greater than the proposed project, the Modified Subdivision Alternative would be environmentally superior, despite the additional ground disturbance.

The Reduced Density Alternative would reduce most impacts associated with the proposed project, again due to the overall reduced level of buildout. However, it would result in similar site disturbance as the proposed project; therefore, impacts to biological resources and cultural resources would be similar, as would some hazards and noise impacts.

Table 6-2
Comparison of Project Alternatives

Issue	Proposed Project	No Project/No Development Alternative	No Project/Existing Zoning Alternative	Modified Subdivision Alternative	Reduced Density Alternative	Clustered Design Alternative
Aesthetics	=	+	+	+	+	+
Air Quality	=	+	+	+	+	+
Biological Resources	=	+	+	+	=	=
Climate Change	=	+	+	+	+	+
Cultural Resources	=	+	+	=/+	=	=/+
Geology and Soils	=	+	+	+	+	+
Hazards	=	+	+	+/=	+/=	+/=
Hydrology and Water Quality	=	+	+	+	+	+/-
Land Use	=	+	=	=	=	=
Noise	=	+	+	=/+	=/+	=/+
Population and Housing	=	+	+	+	+	+
Public Services	=	+	+	+	+	+
Recreation	=	+	+	+	+	+
Transportation and Circulation	=	+	+	+	+	+
Utilities and Service Systems	=	+	+	+	+	+
Overall	n/a	+	+	+	+/=	+/=

+Superior to the proposed project
- Inferior to the proposed project
= Similar impact to the proposed project
***Bold** typeface indicates a significant and unavoidable (Class I) impact.*

This page intentionally left blank.

7.0 REFERENCES AND PREPARERS

7.1 REFERENCES

7.1.1 Bibliography

Archaeological Consulting. June 26, 2007. *Preliminary Archaeological Reconnaissance for Assessor's Parcels 015-021-015, 015-021-020, and 015-021-021, in Carmel, Monterey County, California*.

Archaeological Consulting. June 8, 2016. *Addendum to the Preliminary Archaeological reconnaissance for Assessor's Parcels 015-021-015, 015-021-020, and 015-021-021, in Carmel, Monterey County, California*.

Association of Monterey Bay Area Governments (AMBAG). June 2014a. *Regional Growth Forecast*. Available at: http://www.ambag.org/programs-services/planning/regional-growth-forecast.

Association of Monterey Bay Area Governments (AMBAG). June 2014b. *Regional Housing Needs Allocation Plan 2014-2023 for Monterey and Santa Cruz Counties*. Available at: http://www.ambag.org/programs-services/planning/regional-housing-needs-allocation.

Balance Hydrologics. August 2016. *Review of Stormwater Management and Flood Control Issues at the Carmel Rio Road Project, County of Monterey*.

Buena Geotechnical Services. June 2007. *Geotechnical Engineering Report and Liquefaction Study for Proposed Residential Development Val Verde Drive Monterey County, California*.

Bureau of Land Management (BLM). 2009. *Assessment of Mitigation of Potential Impacts to Paleontological Resources, BLM Instruction Memorandum No. 2009-011.* Available at: http://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos_and_Bulletins/national_instruction/2009/IM_2009-011.html.

Byrne, Paul. 2014.*Visual Impact Study – Carmel Rio Road, LLC*.

California Air Pollution Control Officers Association (CAPCOA). January 2008. *CEQA & Climate Change*. Available at: http://www.capcoa.org/wpcontent/uploads/2012/03/CAPCOA-White-Paper.pdf.

California Air Pollution Control Officers Association (CAPCOA). July 2013a. *CalEEMod User's Guide*. Available at: http://www.aqmd.gov/docs/default-source/caleemod/usersguide.pdf?sfvrsn=2.

California Air Pollution Control Officers Association (CAPCOA). July 2013b. *California Emissions Estimator Model (CalEEMod): User's Guide, Version 2013.2*. Available at: http://www.caleemod.com/.

California Air Resources Board (CARB). May 2014a. *2020 BAU Forecast*.

California Air Resources Board (CARB). June 2014b. *AB 32 Scoping Plan Website*. Available at: http://www.arb.ca.gov/cc/scopingplan/scopingplan.htm.

California Air Resources Board (CARB). May 2015. *California Greenhouse Gas Inventory for 2000-2013*. Available at: http://www.arb.ca.gov/cc/inventory/pubs/reports/ghg_inventory_trends_00-13%20_10sep2015.pdf.

California Air Resources Board (CARB). May 2016a. *Ambient Air Quality Standards*. Available: http://www.arb.ca.gov/research/aaqs/aaqs2.pdf.

California Air Resources Board (CARB). *Aerometric Data Analysis and Measurement System (ADAM), summaries from 2012 to 2014*. Available at: http://www.arb.ca.gov/adam.

California-American Water Company. September 2012. *2010 Urban Water Management Plan*. Available at: http://www.water.ca.gov/urbanwatermanagement/2010uwmps/CA-American%20Water%20-%20Monterey%20District/2010%20UWMP_Monterey%20District_Final.pdf.

California American Water. 2016. *San Clemente Dam Removal & Carmel River Reroute Project*. Available at: http://www.sanclementedamremoval.org/.

California Climate Action Registry (CCAR). January 2009. *General Reporting Protocol*. Available at: http://www.sfenvironment.org/sites/default/files/fliers/files/ccar_grp_3-1_january2009_sfe-web.pdf.

California Climate Change Center (CCCC). 2006. *Climate Scenarios for California*. Available at: http://www.energy.ca.gov/2005publications/CEC-500-2005-186/CEC-500-2005-186-SF.PDF.

California Climate Change Center (CCCC). May 2009. *The Impacts of Sea-Level Rise on the California Coast.* Available at: http://www.energy.ca.gov/2009publications/CEC-500-2009-024/CEC-500-2009-024-F.PDF.

Central Coast Transportation Consulting (CCTC). January 2016. *Rancho Cañada Draft Transportation Impact Study*.

California Department of Conservation. 2016. *Monterey County Williamson Act FY 2015/2016.* 2016. Available: ftp://ftp.consrv.ca.gov/pub/dlrp/wa/Monterey_no_15_16_WA.pdf.

California Department of Conservation. 2012. *California Important Farmland Finder*. Available at: http://maps.conservation.ca.gov/ciff/ciff.html.

California Department of Finance. November 2012. *E-8 Historical Population and Housing Estimates for Cities, Counties, and the State, 2000-2010*. Available at: http://www.dof.ca.gov/Forecasting/Demographics/Estimates/E-8/2000-10/.

California Department of Finance. May 2016. *E-5 Population and Housing Estimates for Cities, Counties, and the State, 2011-2016 with 2010 Census Benchmark*. Available at: http://www.dof.ca.gov/Forecasting/Demographics/Estimates/E-5/.

California Department of Fish and Wildlife. December 2015. *California Natural Diversity Database, Rarefind 5*. 2015a.

California Department of Fish and Wildlife. August 2015. *California Regional Conservation Plans.* 2015b.Available at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=68626.

California Department of Forestry and Fire Protection (CAL FIRE). 2008. *Monterey County: Very High Fire Hazard Severity Zones in Local 7 Responsibility Areas as Recommended by Cal Fire*. Fire and Resource Assessment Program. Available at: http://frap.cdf.ca.gov/data/frapgismaps-subset.php. Accessed on: September 2015.

California Department of Parks and Recreation. 2016. *Hatton Canyon Park Property.* Available at: http://www.parks.ca.gov/?page_id=22273.

California Department of Toxic Substances Control (DTSC). 2016. *Cortese list of Hazardous Waste and Substances Sites*. Available at: http://www.dtsc.ca.gov/SiteCleanup/Cortese_List.cfm.

California Department of Toxic Substances Control (DTSC). Site Mitigation and Brownfields Database. Available at: http://www.epa.gov/enviro/html/bms/index2.html. Accessed on: September 2015.

California Department of Water Resources (DWR). 2004. *Carmel Valley Groundwater Basin, California Groundwater Bulletin 118.* Available at: http://www.water.ca.gov/groundwater/bulletin118/basindescriptions/3-07.pdf.

California Department of Water Resources (DWR). October 2008. *Managing an Uncertain Future: Climate Change Adaption Strategies for California's Water*. Available at: http://www.water.ca.gov/climatechange/docs/ClimateChangeWhitePaper.pdf.

California Department of Water Resources (DWR), California Water Plan, Central Coast, Bulletin 160-09, Volume 3, 2009.

California Department of Water Resources (DWR). 2013. *California Water Plan Update, Central Coast Hydrologic Region, Volume 2*. Available at: http://www.water.ca.gov/waterplan/docs/cwpu2013/Final/Vol2_CentralCoastRR.pdf.

California Energy Commission (CEC). March 2009. *Environmental Health and Equity Impacts from Climate Change and Mitigation Policies in California: A Review of the Literature*. Available at: http://www.energy.ca.gov/2009publications/CEC-500-2009-038/CEC-500-2009-038-D.PDF.

California Environmental Protection Agency (CalEPA). March 2006. *Climate Action Team Report to Governor Schwarzenegger and the Legislature*. Available at: http://www.climatechange.ca.gov/climate_action_team/reports/2006report/2006-04-03_FINAL_CAT_REPORT.PDF.

California Environmental Protection Agency (CalEPA). 2008. *AB 1493 Briefing Package*.

California Environmental Protection Agency (CalEPA). April 2010. *Climate Action Team Biennial Report, Final Report*. Available at: http://www.energy.ca.gov/2010publications/CAT-1000-2010-005/CAT-1000-2010-005.PDF.

California Environmental Protection Agency (CalEPA). 2015a. *Sites identified with waste constituents above hazardous waste levels outside the waste management unit*. Available at: http://www.calepa.ca.gov/SiteCleanup/CorteseList/CurrentList.pdf. Accessed on: September 2015.

California Environmental Protection Agency (CalEPA). 2015b.*Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) database*. Available at: http://www.epa.gov/superfund/sites/cursites/. Accessed on: September 2015.

California Native Plant Society. 2015. *Inventory of Rare and Endangered Plants: Online version v8-02*. Available at: http://www.rareplants.cnps.org/. Accessed on: December 2015.

California Natural Resources Agency. December 2009. *2009 California Climate Adaption Strategy.* Available at: http://www.energy.ca.gov/2010publications/CNRA-1000-2010-010/CNRA-1000-2010-010.PDF.

CalRecycle. 1997. *History of California Solid Waste Law, 1985-1989*. Available at: http://www.calrecycle.ca.gov/laws/legislation/calhist/1985to1989.htm. Accessed on: July 2016.

CalRecycle. 2015a. *Jurisdictional Diversion/Disposal Rate Detail*. Retrieved 11 16, 2015, from CalRecycle: http://www.calrecycle.ca.gov/lgcentral/Reports/DiversionProgram/JurisdictionDiversionDetail.aspx?JurisdictionID=318&Year=2014.

CalRecycle. 2015b. *Jurisdiction Diversion/Disposal Rate Detail*. http://www.calrecycle.ca.gov/lgcentral/Reports/DiversionProgram/JurisdictionDiversionDetail.aspx?JurisdictionID=74&Year=2014. Accessed on: November 2015.

Carmel Area Wastewater District. 2011. *Treatment and Disposal*. Available at: http://www.cawd.org/treatment.html. Accessed on: November 2015.

Carmel Area Wastewater District. 2016a. *Collection*. Available at: http://www.cawd.org/collection.html. Accessed on: July 2016.

Carmel Area Wastewater District. 2016b. *Confirmation of Sewer Service.*

Carmel Public Library Foundation. 2016. *Carmel Public Library Foundation Website*. Available at: http://carmelpubliclibraryfoundation.org/.

Central Coast Regional Water Quality Control Board. 2014. *Waste Discharge Requirements for the Carmel Area Wastewater District Treatment Plant.* Central Coast Regional Water Quality Control Board.

Central Coast Regional Water Quality Control Board. 2016. *Water Quality Control Plan for the Central Coast Basin.* Available at:

http://www.waterboards.ca.gov/centralcoast/publications_forms/publications/basin_plan/current_version/2016_basin_plan_r3_complete.pdf.

Central Coast Regional Water Quality Control Board & California Environmental Protection Agency. 2016. *Amending the Water Quality Control Plan for the Central Coastal Basin to revise beneficial use designations and to make editorial changes, Staff Report*. Available at: http://www.waterboards.ca.gov/centralcoast/publications_forms/publications/basin_plan/bpa_2016_ben_uses_and_edits_staff_rpt_ver28.pdf.

County of Monterey. November 1996. *Carmel Valley Master Plan*. Available at: http://www.landwatch.org/pages/issuesactions/carmelvalley/CarmelValleyMasterPlan-1996.PDF.

County of Monterey. January 2008. *Rancho Canada Village Specific Plan Draft Environmental Impact Report.* Available at: http://www.co.monterey.ca.us/government/departments-i-z/resource-management-agency-rma-/planning/current-major-projects/rancho-canada-village-specific-plan/ranchocanada-deir.

County of Monterey. October 2010. *2010 Monterey County General Plan.* Available at: http://www.co.monterey.ca.us/government/departments-i-z/resource-management-agency-rma-/planning/resources-documents/2010-general-plan.

County of Monterey. November 2012. *General Plan Final EIR*. Available at: http://www.co.monterey.ca.us/government/departments-i-z/resource-management-agency-rma-/planning/resources-documents/2010-general-plan/general-plan-final-environmental-impact-repo.

County of Monterey. February 2013. *Carmel Valley Master Plan Supplemental Policies.* Available at: http://www.co.monterey.ca.us/planning/gpu/GPU_2007/2010_Mo_Co_General_Plan_Adopted_102610/Elements_Area-_Master_Plans/09B-CVMP_10-26-2010%20-%20Amended%20as%20of%2002-12-13.pdf.

County of Monterey. 2014. *Ordinance No. 5250*. Available at: http://www.co.monterey.ca.us/Planning/Long-range-planning/Nighttime_Noise_Ordinance/Ordinance%205250_REF140008_121614.pdf.

County of Monterey. October 2015. *2015-2023 Housing Element Update Initial Study/Negative Declaration*. Available at: http://www.co.monterey.ca.us/planning/cca/pc/2015/11-18-15/REF140087_EXHIBIT_C_INITIAL_STUDY.pdf.

County of Monterey. January 2016. *General Plan: 2015-2023 Housing Element*. Available at: http://www.co.monterey.ca.us/government/departments-i-z/resource-management-agency-rma-/planning/ordinances-plans-under-development/housing-element-update.

County of Monterey. *Code of Ordinances*. Available at: https://www.municode.com/library/ca/monterey_county/codes/code_of_ordinances.

Dibblee, T.W. and J.A. Minch. 2007. *Geologic map of the Monterey and Seaside quadrangles, Monterey County, California*. Available at: http://ngmdb.usgs.gov/Prodesc/proddesc_83291.htm.

Earth Systems Pacific. January 2010. *Geological Hazards Study: Val Verde Residential Development*.

Education Data Partnership. 2015. *Carmel Unified School District*. Available at: http://www.ed-data.org/district/Monterey/Carmel-Unified.

Federal Emergency Management Agency (FEMA). 2016. FEMA Flood Map Service Center, National Flood Hazard. Available at: https://msc.fema.gov/portal.

Fellers, G. M. and P. M. Kleeman. 2007. *California red-legged frog (Rana draytonii) movement and habitat use: implications for conservation*. Journal of Herpetology 41(2): 271-281

Hatch Mott MacDonald. June 2016. *Val Verde Subdivision Traffic Impact Analysis Draft Report*.

Hayes, M.P. and M. R. Jennings. 1988. *Habitat correlates of distribution of the California red-legged frog (Rana aurora draytonii) and the foothill yellow-legged frog (Rana boylii): Implications for management*. In Proceedings of the symposium on the management of amphibians, reptiles, and small mammals in North America. R. Sarzo, K.E. Severson, and D.R. Patton, (technical coordinators). U.S.D.A. Forest Service General Technical Report RM-166. p. 144-158.

Holland, Robert F. 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California*. California Department of Fish and Game, Nongame Heritage Program. p.156.

Intergovernmental Panel on Climate Change (IPCC). 1997. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. [Kroeze, C.; Mosier, A.; Nevison, C.; Oenema, O.; Seitzinger, S.; Cleemput, O. van; Conrad, R.; Mitra, A.P.; H.U., Neue; Sass, R.], Paris: OECD.

Intergovernmental Panel on Climate Change (IPCC). 2007. *Summary for Policymakers*. In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)], Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

Intergovernmental Panel on Climate Change (IPCC). 2013. *Summary for Policymakers*. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

Intergovernmental Panel on Climate Change (IPCC). 2014. *Summary for Policymakers*. In: Climate Change 2014, Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

Monterey Bay Air Resources District (MBARD). February 2008a. *CEQA Air Quality Guidelines.* Available at: http://mbuapcd.org/pdf/CEQA_full%20(1).pdf.

Monterey Bay Air Resources District (MBARD). August 2008b. *Air Quality Management Plan*. Available at: http://www.mbuapcd.org/mbuapcd/pdf/Planning/2008AirQualityManagementPlan1.pdf.

Monterey Bay Air Resources District (MBARD). April 2013. *Triennial Plan Revision*.

Monterey Bay Air Resources District (MBARD). January 2015. *NCCAB Area Designations and Attainment Status*. Available at: http://mbuapcd.org/wp-content/uploads/2015/01/attainment-status-january-2015.pdf.

Monterey County. October 2014. *County Service Area 50 Final Lower Carmel River Stormwater Management and Flood Control Report*. Available at: http://www.co.monterey.ca.us/planning/major/EPB%20and%20Scenic%20Road%20Protection/CSA-50_Lower_Carmel_River_Flood_Control_Study/CSA-50_FLOOD_CONTROL_REPORT_FINAL_103114.pdf.

Monterey County. 2015. *Draft Environmental Impact Report (DEIR) Carmel Canine Sports Center, Section 4.8: Hydrology and Water Quality*. Available at: http://www.co.monterey.ca.us/planning/major/Carmel_Canine_Sports_Center/DEIR_040115/DEIR_PLN130352_040115_CH4_S4-08.pdf.

Monterey County. 2016. *Rancho Cañada Village Recirculated Draft Environmental Impact Report, Chapter 3.2: Hydrology and Water Quality.* Available at: http://www.co.monterey.ca.us/home/showdocument?id=12547.

Monterey County Airport Land Use Commission. 1987. *Comprehensive Land Use Plan for Monterey Peninsula Airport*. Available at: http://www.co.monterey.ca.us/planning/docs/plans/Monterey_Peninsula_Airport_LUP.pdf.

Monterey County Free Libraries. 2016. *Monterey County Free Libraries Website.* Available at: http://www.co.monterey.ca.us/library/#.

Monterey County Planning and Building Inspection Department. 2007. *Draft Environmental Impact Report, Monterey County 2007 General Plan*. Available at: http://www.co.monterey.ca.us/Planning/gpu/2007_GPU_DEIR_Sept_2008/Text/Sec_04.12_Park_Recreation_Open_Spaces.pdf.

Monterey County Sheriff's Office. 2016. *Patrol Division.* Available at: https://www.montereysheriff.org/patrol/.

Monterey Peninsula Regional Park District. 2016. *Park Locator*. Available at: http://www.mprpd.org/parks-preserves/parks-locator/

Monterey Peninsula Water Management District (MPWMD). 2004. *Executive Summary: Environmental and Biological Assessment of Portions of the Carmel River Watershed, Monterey*

County, California. Available at: http://carmelriverwatershed.org/wp-content/uploads/2012/12/321_CarmelRiver.pdf.

Monterey Peninsula Water Management District (MPWMD). August 19, 2013. *Public Presentation: CSUMB/USDA Interns Julianne Rhodes & Evan DeLay on Their Field Work Experience with the District in Lagoon & River Surface Water Quality Monitoring, with a Summary of Their Final Reports*. Available at: http://www.mpwmd.net/asd/board/boardpacket/2013/20130819/ppt/PublicPresentation.pdf.

Monterey Peninsula Water Management District (MPWMD). 2014. *Central Coast Regional Water Quality Control Board (RWQCB). Monterey Peninsula, Carmel Bay, and South Monterey Bay Integrated Regional Water Management Plan Update*. Available at: http://www.water.ca.gov/irwm/grants/docs/Archives/Prop84/Submitted_Applications/P84_2014Drought/Monterey%20Peninsula%20Water%20Management%20District%20(201498760038)/Attachment%201%20-%20Att1_DG_Eligible_5of14.pdf.

Monterey Peninsula Water Management District (MPWMD). 2016a. *Carmel River Flows*. Available at: http://www.mpwmd.net/wrd/riverflows/riverflows.htm.

Monterey Peninsula Water Management District (MPWMD). 2016b. *Special Meeting and Closed Session Board of Directors.* Available at: http://www.mpwmd.net/wp-content/uploads/Jan-27.pdf.

Monterey Regional Waste Management District (MRWMD). 2014. *Monterey Regional Waste Management District Programs and Facilities*. Available at: http://www.mrwmd.org/programs-services/disposal/monterey-peninsula-landfill/. Accessed on: November 2015.

National Park Service, National Register of Historic Places. Accessed July 2016a. Available: http://www.nps.gov/nr/.

National Park Service, National Historic Landmarks Program. Accessed July 2016b. Available: http://www.nps.gov/nhl/.

National Oceanic & Atmospheric Association (NOAA). 2015. *Annual Greenhouse Gas Index*. Available at: http://www.esrl.noaa.gov/gmd/aggi/aggi.html.

Parmesan, C. 2006. *Ecological and Evolutionary Responses to Recent Climate Change.*

Parmesan C, Galbraith H. 2004. *Observed Impacts of Climate Change in the US, Arlington VA*. Pew Cent. Glob. Clim. Change.

Rana Creek Habitat Restoration. May 2007. *Biological Assessment for the Vale Verde Property, Vale Verde Drive, Carmel*. Prepared for Carmel Rio Road, LLC.

Rana Creek Habitat Restoration. March 2012. *Updated Biological Assessment for the Vale Verde Property, Vale Verde Drive, Carmel*. Prepared for Carmel Rio Road, LLC.

Seavey, Kent. April 9, 2010. *Phase I historic Review of the residential property at 26500 Val Verde Rd. (APN# 015-021-020).*

Seavey, Kent. April 9, 2016. *Addendum to the Phase I historic Review of the residential property at 26500 Val Verde Rd. (APN# 015-021-020).*

Society of Vertebrate Paleontology. 2010. *Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources*. Society of Vertebrate Paleontology, pp. 1–11.

State Water Resources Control Board (SWRCB). 2016. *Geotracker*. Available at: http://geotracker.swrcb.ca.gov/search/. Accessed on: September 2015.

State Water Resources Control Board (SWRCB). 2016. *2012 Integrated Report, Clean Water Act Section 303(d) List/305(b) Report*. Available at: http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2012.shtml.

The Watershed Institute. 2004. *Physical and Hydrologic Assessment of the Carmel River Watershed California.* Available at: http://ccows.csumb.edu/pubs/reports/CCoWS_CRWC_CarmAssPhysHyd_041101.pdf.

Todd Groundwater. August 2016. *Carmel Rio Road EIR – Groundwater Supply Technical Report.*

United Nations. 2011. *Gateway to the United Nations Systems Work on Climate Change: Durban conference delivers breakthrough in international community's response to climate change*. November Available at: http://www.un.org/climatechange/blog/2011/12/durban-climate-conference-delivers-breakthrough/.

United Nations Framework Convention on Climate Change (UNFCCC). August 2007. *United Nations Framework Convention on Climate Change*. Available at: http://unfccc.int/files/essential_background/convention/status_of_ratification/application/pdf/unfccc_conv_rat.pdf.

United Nations Framework Convention on Climate Change (UNFCCC). November 2011. *Outcome of the work of the Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol at its sixteenth session*. Available at: http://unfccc.int/files/meetings/durban_nov_2011/decisions/application/pdf/awgkp_outcome.pdf. Accessed on: September 2012.

United Nations Framework Convention on Climate Change (UNFCCC). March 2012. *Report of the Conference of the Parties on its seventeenth session, held in Durban from 28 November to 11 December 2011*.

United States Department of Transportation, Federal Transit Authority (FTA). May 2006. *Transit Noise and Vibration Impact Assessment*, *FTA-VA-90-1003-06*.

U.S. Department of Energy, Energy Information Administration. August 2010. *Annual Energy Review 2009*. Available at: http://www.eia.gov/aer/envir.html.

United States Department of Agriculture (USDA). March 2003. *Pico Series*. Available at: https://soilseries.sc.egov.usda.gov/OSD_Docs/P/PICO.html.

United States Department of Agriculture (USDA). 2016. *Web Soil Survey*. Natural Resources Conservation Service. Available at: http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx.

United States Census Bureau. *2009-2013 American Community Survey 5-Year Estimates*. Available at: http://www.factfinder.census.gov.

United States Environmental Protection Agency (USEPA). March 2011. *PSD and Title V Permitting Guidance for Greenhouse Gases*. Available at: http://www3.epa.gov/nsr/ghgdocs/ghgpermittingguidance.pdf.

United States Environmental Protection Agency (USEPA). April 2015. *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2014*. U. S. EPA #430-R-11-005. Available at: http://www.epa.gov/climatechange/emissions/usinventoryreport.html.

United States Environmental Protection Agency (USEPA). *CERCLIS Search.* 2016. Available at: https://www.epa.gov/enviro/sems-search.

United States Fish and Wildlife Service (USFWS). 2015a. *Critical Habitat Portal*. Available at: http://ecos.fws.gov/ecp/report/table/critical-habitat.html.

United States Fish and Wildlife Service (USFWS). 2015b. *Information, Planning, and Conservation System (IPAC)*. Available at: https://ecos.fws.gov/ipac/. Accessed on: December 2015.

United States Geological Survey (USGS). 2011. Reported Historic Asbestos Mines, Historic Asbestos Prospects, and Other Natural Occurrences of Asbestos in California. Available at: file:///C:/Users/ljourney/Downloads/Pamphlet%20(1).pdf.

Western Regional Climate Center. December 2014. *Monterey, California*. Available at: http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca5795.

(29 U.S.C. §651 et seq.) *29 U. S. Code Chapter 15 – Occupational Safety and Health.* Occupational Safety and Health Act of 1970. Available at: https://www.law.cornell.edu/uscode/text/29/chapter-15.

(29 CFR §1910.95) *Enforcement Guidance for Personal Protective Equipment in General Industry, Occupational Noise Exposure.* U. S. Occupational Safety & Health Administration Available at: https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9735.

7.1.2 Agencies/Individuals Contacted

Galetti, Donna. Sergeant. Monterey County, Office of the Sheriff. August 2016. Personal Communication (email).

Lander, Drew. Principal Engineer. Carmel Area Wastewater District. November 11, 2015. Personal Communication (email).

Lander, Drew. Principal Engineer. Carmel Area Wastewater District. July 3, 2016a. Personal Communication (phone).

Lander, Drew. Principal Engineer. Carmel Area Wastewater District. July 5, 2016b. Personal Communication (email).

Lander, Drew. Principal Engineer. Carmel Area Wastewater District. July 6, 2016c. Personal Communication (email).

Paul, Dan. Director of Facilities and Transportation. Carmel Valley Unified School District. September 18, 2015, October 6, 2015, and October 16, 2015. Personal Communication (email).

Oates, Julie. Project Engineer. Mott MacDonald. July 28, 2016. Personal Communication (email).

Schubert, Bob. Senior Planner. Monterey County RMA – Planning Department. July 18 – July 21, 2016. Personal Communication (email).

Veyna, Garrett. CFPD Fire Marshal. September 21, 2015. Personal Communication (email).

7.2 LIST OF PREPARERS

This EIR was prepared by Rincon Consultants, Inc. under contract to the County of Monterey. Mr. Bob Schubert served as project manager for the County of Monterey. Persons involved in data gathering, analysis, project management, and quality control include:

Rincon Consultants, Inc.

Stephen Svete, Vice President, Principal-in-Charge
Megan Jones, MPP, Senior Program Manager, Project Manager
Christy Sabdo, Senior Environmental Project Manager
Kevin Hunt, Cultural Resources Program Manager
David Daitch, Program Manager/Senior Biologist
Chris Bersbach, Air Quality and Noise Program Manager
Eric VonBerg, Senior Project Manager
Matthew Long, Senior Environmental Scientist
Susan Schilder-Thomas, Associate Environmental Planner
Skyler Murphy, Associate Planner
Lexi Journey, Associate Planner
Sarah Sorenson, Associate Planner
Andrew Hall, Environmental Planning and Sustainability Group Intern
Chris Thomas, Graphic Illustrator
Allysen Valencia, GIS Analyst

Balance Hydrologics

Ed Ballman, Principal Engineer

Todd Groundwater

Gus Yates, Senior Hydrologist

This page intentionally left blank.

Appendix A

Notice of Preparation and Letters

Print Form

Appendix C

Notice of Completion & Environmental Document Transmittal

Mail to: State Clearinghouse, P.O. Box 3044, Sacramento, CA 95812-3044 (916) 445-0613
For Hand Delivery/Street Address: 1400 Tenth Street, Sacramento, CA 95814

SCH #

Project Title: Carmel Rio Road Subdivision

Lead Agency: Monterey County | Contact Person: Bob Schubert
Mailing Address: 168 West Alisal | Phone: (831) 755-5183
City: Salinas | Zip: 93901 | County: Monterey

Project Location: County: Monterey | City/Nearest Community: Carmel
Cross Streets: Val Verde Drive & Rio Road | Zip Code: ____
Longitude/Latitude (degrees, minutes and seconds): ____° ____ ′ ____ ″ N / ____° ____ ′ ____ ″ W | Total Acres: 7.9 acres
Assessor's Parcel No.: 015-021-020-000 | Section: ____ | Twp.: ____ | Range: ____ | Base: ____
Within 2 Miles: State Hwy #: Highway 1 | Waterways: ____
Airports: ____ | Railways: ____ | Schools: ____

Document Type:

CEQA: ☒ NOP ☐ Early Cons ☐ Neg Dec ☐ Mit Neg Dec ☐ Draft EIR ☐ Supplement/Subsequent EIR (Prior SCH No.) ____ Other: ____
NEPA: ☐ NOI ☐ EA ☐ Draft EIS ☐ FONSI
Other: ☐ Joint Document ☐ Final Document ☐ Other: ____

Local Action Type:

☐ General Plan Update ☐ General Plan Amendment ☐ General Plan Element ☐ Community Plan
☐ Specific Plan ☐ Master Plan ☐ Planned Unit Development ☐ Site Plan
☐ Rezone ☐ Prezone ☐ Use Permit ☒ Land Division (Subdivision, etc.)
☐ Annexation ☐ Redevelopment ☐ Coastal Permit ☐ Other: ____

Development Type:

☒ Residential: Units 31 units Acres 7.9 acres
☐ Office: Sq.ft. ____ Acres ____ Employees ____
☐ Commercial: Sq.ft. ____ Acres ____ Employees ____
☐ Industrial: Sq.ft. ____ Acres ____ Employees ____
☐ Educational: ____
☐ Recreational: ____
☐ Water Facilities: Type ____ MGD ____
☐ Transportation: Type ____
☐ Mining: Mineral ____
☐ Power: Type ____ MW ____
☐ Waste Treatment: Type ____ MGD ____
☐ Hazardous Waste: Type ____
☐ Other: ____

Project Issues Discussed in Document:

☒ Aesthetic/Visual ☐ Agricultural Land ☒ Air Quality ☒ Archeological/Historical ☒ Biological Resources ☐ Coastal Zone ☒ Drainage/Absorption ☐ Economic/Jobs
☐ Fiscal ☒ Flood Plain/Flooding ☐ Forest Land/Fire Hazard ☒ Geologic/Seismic ☐ Minerals ☒ Noise ☒ Population/Housing Balance ☒ Public Services/Facilities
☒ Recreation/Parks ☐ Schools/Universities ☐ Septic Systems ☐ Sewer Capacity ☐ Soil Erosion/Compaction/Grading ☐ Solid Waste ☐ Toxic/Hazardous ☒ Traffic/Circulation
☐ Vegetation ☒ Water Quality ☒ Water Supply/Groundwater ☐ Wetland/Riparian ☐ Growth Inducement ☒ Land Use ☐ Cumulative Effects ☐ Other: ____

Present Land Use/Zoning/General Plan Designation:

Project Description: *(please use a separate page if necessary)*
The project proposed by Carmel Rio Rd, LLC consists of a standard subdivision of a 7.9-acre property to allow the development of 31 units including 24 single family lots and one parcel with seven deed-restricted inclusionary units. The project would require an Administrative Permit and Design Approval for development in the "S" (Site Control) and "D" (Design Control) zoning districts. A Zoning Ordinance Amendment would also be required to add a clarification to Section 21.14.050 that allows an exception to exceed a 4 unit/acre lot density for the purpose of affordable housing pursuant to Policy CV 1.10 in the Carmel Valley Master Plan.

Note: The State Clearinghouse will assign identification numbers for all new projects. If a SCH number already exists for a project (e.g. Notice of Preparation or previous draft document) please fill in.

Reviewing Agencies Checklist

Lead Agencies may recommend State Clearinghouse distribution by marking agencies below with and "**X**".
If you have already sent your document to the agency please denote that with an "**S**".

____	Air Resources Board	____	Office of Historic Preservation
____	Boating & Waterways, Department of	____	Office of Public School Construction
____	California Emergency Management Agency	____	Parks & Recreation, Department of
____	California Highway Patrol	____	Pesticide Regulation, Department of
X	Caltrans District #5	____	Public Utilities Commission
____	Caltrans Division of Aeronautics	X	Regional WQCB # ____
____	Caltrans Planning	____	Resources Agency
____	Central Valley Flood Protection Board	____	Resources Recycling and Recovery, Department of
____	Coachella Valley Mtns. Conservancy	____	S.F. Bay Conservation & Development Comm.
____	Coastal Commission	____	San Gabriel & Lower L.A. Rivers & Mtns. Conservancy
____	Colorado River Board	____	San Joaquin River Conservancy
____	Conservation, Department of	____	Santa Monica Mtns. Conservancy
____	Corrections, Department of	____	State Lands Commission
____	Delta Protection Commission	____	SWRCB: Clean Water Grants
____	Education, Department of	X	SWRCB: Water Quality
____	Energy Commission	X	SWRCB: Water Rights
X	Fish & Game Region # ____	____	Tahoe Regional Planning Agency
____	Food & Agriculture, Department of	____	Toxic Substances Control, Department of
____	Forestry and Fire Protection, Department of	____	Water Resources, Department of
____	General Services, Department of		
____	Health Services, Department of	____	Other: ____
____	Housing & Community Development	____	Other: ____
____	Native American Heritage Commission		

Local Public Review Period (to be filled in by lead agency)

Starting Date July 20, 2015 Ending Date August 19, 2015

Lead Agency (Complete if applicable):

Consulting Firm: Rincon Consultants
Address: 437 Figureroa
City/State/Zip: Monterey, CA 93940
Contact: Megan Jones
Phone: (831) 333-0310 ext. 250

Applicant: Brian Clark
Address: 430 Ortiz Avenue
City/State/Zip: Sand City, CA 93955
Phone: (831) 899-6666

Signature of Lead Agency Representative: Robert Schubert **Date:** 7/1/15

Authority cited: Section 21083, Public Resources Code. Reference: Section 21161, Public Resources Code.

MONTEREY COUNTY
RESOURCE MANAGEMENT AGENCY - PLANNING

Mike Novo, AICP, Director of Planning

168 West Alisal Street, 2nd Floor
Salinas, CA 93901
(831) 755-5025
Fax: (831) 757-9516
www.co.monterey.ca.us/rma

FILED
JUL 16 2015
STEPHEN L. VAGNINI
MONTEREY COUNTY CLERK
DEPUTY

NOTICE OF PREPARATION

To: Responsible Agencies/Interested Parties

From: Bob Schubert, Senior Planner
Monterey County Resource Management Agency – Planning Department

SUBJECT: **Notice of Preparation (NOP) of a Draft Environmental Impact Report (DEIR) for the Carmel Rio Road Subdivision (PLN140089)**

The County of Monterey will be the Lead Agency and will prepare an Environmental Impact Report (EIR) for the Combined Development Permit application for development of the Carmel Rio Road Subdivision (Planning File Number: PLN140089). The project site is located at 15 and 26500 Val Verde Drive and is currently zoned Low Density Residential with a maximum gross density of one unit per acre, Design Control, Site Plan Review, and Residential Allocation Zoning (LDR/1-D-S-RAZ). The project proposed by Carmel Rio Rd, LLC consists of a standard subdivision of a 7.9-acre property to allow the development of 31 units including 24 single family lots and one parcel with seven deed-restricted inclusionary units. The project would require an Administrative Permit and Design Approval for development in the "S" (Site Control) and "D" (Design Control) zoning districts. A Zoning Ordinance Amendment would also be required to add a clarification to Section 21.14.050 that allows an exception to exceed a 4 unit/acre lot density for the purpose of affordable housing pursuant to Policy CV 1.10 in the Carmel Valley Master Plan. We need to know the views of your agency as to the scope and content of the environmental information which is germane to your agency's statutory responsibilities in connection with the proposed project. Your agency may need to use the EIR prepared by our agency when considering your permit or other approval for the project.

Pursuant to the public participation goals of CEQA, the County of Monterey will host an EIR scoping meeting to gather additional input on the content and focus of the environmental analysis to be conducted and presented in the EIR. The date, time, and location of the scoping meetings are listed below.

Thursday, July 30th
6:30 PM
St Phillips Lutheran Church
8065 Carmel Valley Road
Carmel, CA 93923

The project description, location, and the potential environmental effects are contained in the attached materials.

Due to time limits mandated by state law, your response must be sent at the earliest possible date but not later than 30 days after receipt of this notice between July 20, 2105 and August 19, 2015.

Please submit your response to the address shown above. We will need the name for a contact person in your agency.

Sincerely,

Bob Schubert

/S/ Bob Schubert, Senior Planner
831-755-5183

Attachments:
Project Description
Vicinity Map
Site Plan

PROJECT LOCATION

The project site is located at 15 and 26500 Val Verde Drive, within the Carmel Valley Master Plan Area, in Carmel Valley, Monterey County, CA. The project site is comprised of three parcels (Assessor's Parcel Numbers [APN] 015-021-020-000, 015-021-021-000 & 015-021-015-000).

The project site is bordered to the north and south by rural density single family residences, to the east (across Val Verde Drive) by open space (previously approved for development of the Carmel Community Life Center, for which entitlements have expired), and to the west by existing commercial use buildings and parking lots which are entered from Carmel Rancho Boulevard.

PROJECT DESCRIPTION

The project applicant is requesting a Combined Development Permit consisting of: (1) standard subdivision of three existing lots totaling 7.9-acres into 24 market rate lots and one inclusionary housing lot; and (2) Administrative Permit and Design Approval for development in the “S” (Site Review) and “D” (Design Review) Zoning District. A Zoning Ordinance Amendment would also be required to add a clarification to Section 21.14.050 that allows an exception to exceed a 4 unit/acre lot density for the purpose of affordable housing pursuant to Policy CV 1.10 in the Carmel Valley Master Plan.

The project would allow for the development of 24 market rate single family homes and seven inclusionary units (affordable housing). Single family lots would range from 0.24 to 0.38 acre, and it is anticipated that each single family home would be approximately 1,670 square feet in size. The inclusionary lot would be 0.91 acre and each of the seven units would be approximately 860 square feet. Access would be provided from Val Verde Drive. One internal looped road would be constructed on the site, with two entrances to Val Verde Drive.

Two of the three parcels (totaling 6.6 acres) are currently used for row crop agriculture (including strawberries, melons, artichokes, squash, pumpkins, fennel, fava beans, zucchini, radishes, and flowers). The third parcel (1.3 acres), which abuts Val Verde Drive in the southeast corner of the site, includes an existing single-family residence. This residence would be removed.

Water would be provided by existing on-site wells and the establishment of a Community Water Distribution System. Wastewater service would be provided via connection to the Carmel Area Wastewater District (CAWD). The project site is currently outside the CAWD boundaries, and as such will have to be annexed to CAWD before service can be provided.

POTENTIAL ENVIRONMENTAL EFFECTS

Aesthetics, Air Quality, Biological Resources, Climate Change, Cultural Resources, Geology and Soils, Hydrology and Water Quality, Land Use and Planning, Noise, Population and Housing, Public Services, Recreation, Traffic and Circulation, and Utilities and Service Systems.

Cc: State Clearinghouse, Office of Planning and Research
1400 Tenth Street, Room 212
P.O. Box 3044
Sacramento, CA 95812-3044

Imagery provided by ESRI and its licensors © 2015.

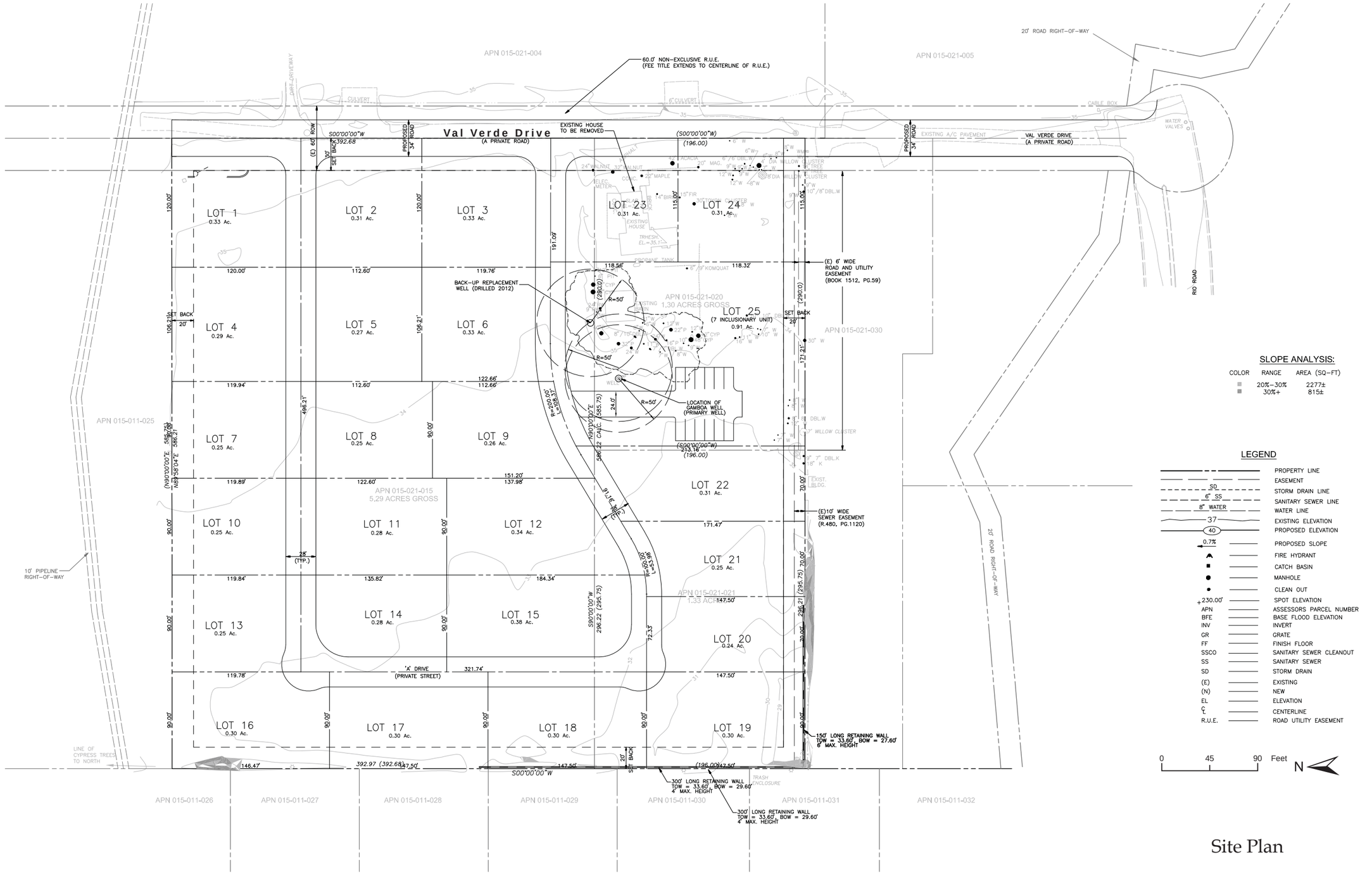
Project Location

N

0 0.5 1
Miles

Regional Location

Figure 1



Site Plan

Source: BESTOR ENGINEERS, 2014.

Figure 2

County of Monterey

Monterey Bay Unified
Air Pollution Control District
Serving Monterey, San Benito, and Santa Cruz Counties

24580 Silver Cloud Court
Monterey, CA 93940
PHONE: (831) 647-9411 • FAX: (831) 647-8501

July 23, 2015

Bob Schubert, Senior Planner
County of Monterey Resource Management Agency – Planning Department
168 West Alisal Street, 2nd Floor
Salinas, CA 93901

JUL 27 2015

Subject: Comments on Carmel Rio Road Subdivision Notice of Preparation (PLN140089)

Dear Mr. Schubert:

Thank you for providing the Monterey Bay Unified Air Pollution Control District (Air District) the opportunity to comment on the above-referenced document. The Air District has reviewed the document and has the following comments.

- Please refer to the Air District's CEQA Guidelines when evaluating potential air quality impacts of the project. The Air District's guidelines can be downloaded here: http://mbuapcd.org/programs-resources/planning/ceqa/.

- The Air District recommends using the CalEEMod model for estimating construction and operation emissions from the proposed project. This model can be downloaded from www.caleemod.com.

- Please review the Air District's Consistency Procedure spreadsheet available online at http://mbuapcd.org/programs-resources/planning/ceqa/ to assist with the consistency determination with the air quality plan.

- The Air District recommends implementing design measures to minimize air quality and greenhouse gas impacts such as the following:

    - Do not install wood burning fireplaces or wood stoves. Fireplaces, stoves, or furnaces that operate with natural gas have much lower emissions.
    - Install an electric vehicle charging station(s) in a common area accessible to residents.

Please let me know if you have any questions. I can be reached at (831) 718-8013 or aclymo@mbuapcd.org.

Best Regards,

Amy Clymo
Supervising Air Quality Planner

DEPARTMENT OF TRANSPORTATION
50 HIGUERA STREET
SAN LUIS OBISPO, CA 93401-5415
PHONE (805) 549-3101
FAX (805) 549-3329
TTY 711
http://www.dot.ca.gov/dist05/

Serious drought
Help save water!

AUG 0 3 2015

July 28, 2015

MON-001-72.61
SCH# 2015071046

Bob Schubert
Monterey County Planning Department
168 West Alisal, 2nd Floor
Salinas, CA 93901

Dear Mr. Schubert:

COMMENTS TO CARMEL RIO ROAD SUBDIVISION NOTICE OF PREPARATION

The California Department of Transportation (Caltrans), District 5, Development Review, has reviewed the above referenced project and offers the following comments.

1. Caltrans supports local planning efforts that are consistent with State planning priorities intended to promote equity, strengthen the economy, protect the environment, and promote public health and safety. We accomplish this by working with local jurisdictions to achieve a shared vision of how the transportation system should and can accommodate interregional and local travel.

2. To ensure the traffic study in the Draft EIR includes the information needed to analyze the impacts (both cumulative and project-specific) of this effort, it is recommended that the analysis be prepared in accordance with the Department's *"Guide for the Preparation of Traffic Impact Studies."* An alternative methodology that produces technically comparable results can also be used.

3. Because we are responsible for the safety, operations, and maintenance of the State transportation system, our Level of Service (LOS) standards should be used to determine the significance of the project's impact. We endeavor to maintain a target LOS at the transition between LOS C and LOS D on all State transportation facilities.

4. Our future comments to this, and any subsequent EIR for the project, will stress the importance of using the Association of Monterey Bay Area Governments Model for traffic analysis, and to include all impacted transportation agencies early and often in the discussions.

5. The traffic study should include information on existing traffic volumes within the study area, including the State transportation system, and should be based on recent traffic volumes less than two years old. Counts older than two years cannot be used as a baseline. Feel free to contact us for assistance in acquiring the most recent data available.

6. The methodologies used to calculate the LOS should be consistent with the methods in the current version of the Highway Capacity Manual. All LOS calculations should also be included in the Draft EIR as an appendix made available for review.

7. At any time during the environmental review and approval process, Caltrans retains the statutory right to request a formal scoping meeting to resolve any issues of concern. Such formal scoping meeting requests are allowed per the provisions of the California Public Resources Code Section 21083.9 [a] [1].

8. Any work within the State right-of-way will require an encroachment permit issued from Caltrans. Detailed information such as complete drawings, biological and cultural resource findings, hydraulic calculations, environmental reports, traffic study, etc., may need to be submitted as part of the encroachment permit process.

If you have any questions, or need further clarification on items discussed above, please don't hesitate to call me at (805) 542-4751.

Sincerely,

JOHN J. OLEJNIK
Associate Transportation Planner
District 5 Development Review Coordinator
john.olejnik@dot.ca.gov

MONTEREY PENINSULA WATER MANAGEMENT DISTRICT

August 11, 2015

AUG 17 2015

Robert Schubert, Senior Planner
Monterey County RMA Planning Department
168 West Alisal Street, 2nd Floor
Salinas, CA 93901

SUBJECT: MPWMD COMMENTS ON NOTICE OF PREPARATION OF DRAFT EIR FOR CARMEL RIO ROAD SUBDIVISION; APN 015-021-015, -020 and -021; 15 and 26500 Val Verde Drive, Carmel; County ID# PLN140089 [SCH# not provided] MPWMD Application #WDS-20090204RIO

Dear Mr. Schubert:

This letter from the Monterey Peninsula Water Management District (MPWMD or District) is written in response to the Notice of Preparation of a Draft Environmental Impact Report (DEIR) circulated by Monterey County for the proposed Carmel Rio Road Subdivision. The project proposes 24 market rate single-family residential lots, and one inclusionary housing lot comprised of seven units that would be served by wells that currently provide water for agricultural irrigation on the subject parcels. The District serves as a Responsible Agency under CEQA for this project because a MPWMD Water Distribution System (WDS) Permit is needed to amend the current water system to serve the Subdivision (MPWMD Rule 20-A). MPWMD Water Permits are also required for each of the residential units as part of the County building permit process. MPWMD areas of authority include hydrology/water quality, water/utilities, and the MPWMD Mitigation Program for the Carmel River aquatic habitat, dependent species, and riparian corridor.

Hydrology/Water Quality and Related Aquatic Biology Issues: The District notes that current water extractions are applied to agricultural crops, with some of the water percolating back into the Carmel Valley Alluvial Aquifer (CVAA) as "return flow." In addition to the standard CEQA questions about construction and operation impacts, the Hydrology and Water Quality Chapter should assess the effects of the change from agricultural irrigation to consumptive water service to the Subdivision and sanitary sewers. Specific issues include:

- Estimate amount of return flow into the aquifer from pre-project agricultural irrigation;
- Estimate loss of return flow due to new project hardscape that replaces percolating soils;
- Assess effect of loss of return flow on the CVAA water levels and/or streamflow in the Carmel River adjacent to the subdivision, which can affect riparian vegetation and/or Carmel River aquatic life such as threatened steelhead fish and red-legged frog habitats;
- Assess water quality effects of agricultural practice versus residential uses; and
- Identify mitigation measures to reduce significant adverse effects, if applicable.

Water Rights and Adequate Water Supply: Carmel Rio submitted a formal application to MPWMD in February 2009 to create the Carmel Rio WDS. As part of a previous District review

(Travers), District Counsel determined in a January 31, 2006 letter that adequate riparian rights were documented for the proposed WDS at that time. This would remain true so long as the water is applied to the riparian parcels within the mapped alluvial aquifer. In a March 24, 2009 letter, the District confirmed that the technical information appeared to be complete and the District concurred with the conclusions of adequate supply for a 42-unit project and less than significant impact to other alluvial well owners, pursuant to District methodology. The water demand analysis also appeared to be reasonable at that time (2009). It is noted that standards and requirements for water using fixtures have changed since 2009. Thus, the applicant and EIR preparers should consult with the District Water Demand Division to ensure that current water use estimates are accurate, and learn about requirements related to water-using fixtures and outdoor irrigation for the project.

Water Use Baseline: The District and the applicant have exchanged correspondence related to the question of the CEQA baseline for water use and the baseline used for the MPWMD WDS Permit. MPWMD believes that there is the ability to use water from the subject wells for the proposed Subdivision, but the specific amount of water available and how it will be distributed will not be formally determined until completion of the WDS Permit process, including a public hearing before the MPWMD Board of Directors. A District June 12, 2015 letter to applicant Brian Clark stated:

> The County of Monterey is the CEQA Lead Agency for the project and is the entity that will determine the CEQA baseline for its review of the proposed project. However, for the District's WDS Permit, the District policy is to use the protocol set by the District Board in 2006 for wells in the Carmel Valley Alluvial Aquifer (CVAA). This entails using a 10-year average of water use as a baseline for setting a production limit. If you submit a revised application [to reflect the current project], the District is willing to use the 10-year average starting with the most recent 10 years of water production data. Otherwise, the District would use the 10-year average prior to the February 2009 original application (i.e., WY 1999 through 2008) as a baseline. Alternately, if you choose to request a production limit that is higher than the 10-year average historical use, the cumulative impacts to the Carmel River from increased water use must be evaluated in an Environmental Impact Report and any mitigation proposed must fully address those impacts. The CVAA protocol is on the District website at: http://www.mpwmd.net/pae/wds/WDSPermits/WDSMemo3.pdf.

It is noted that concerns have been raised about significant increases in water use in recent years. District staff will evaluate whether this is due to water waste or unauthorized new uses as part of its assessment.

My staff and I are available to meet if further coordination is needed. I can be reached at dstoldt@mpwmd.net or 831/658-5650 if you have questions. The staff contact is Henrietta Stern, Project Manager, at henrietta@mpwmd.net or 831/658-5621; the District Engineer is Larry Hampson at larry@mpwmd.net or 831/658-5620; the Water Demand manager is Stephanie Locke at slocke@mpwmd.net or 831/658-5630.

Sincerely,

David J. Stoldt
General Manager

Cc: Brian Clark, Carmel Rio
Henrietta Stern, MPWMD Project Manager
David Laredo, MPWMD Counsel

U:\mpwmd\CEQA\CarmelRio_CommentsonNOPforEIR_20150805.docx
Prepared by H. Stern on 8/10/2015 – with JO edits LH/KU approve

Appendix B

Visual Impact Study

Visual Impacts Study - Carmel Rio Road, LLC

Prepared by:

Paul Byrne, Architect LEED AP
26135 S Carmel Hills Dr.
Carmel, CA 93923

Deliverables:
1) Existing Site Visual Conditions & Review from Public Roadways
2) Pre & Post Construction Visual Impacts Study
3) Photo Simulations
4) Architectural Renderings - Conceptual

Monterey County RMA Planning #PLN140089

Visual Impacts Scope of Work: Future residential project visual impact when viewed from public areas, roadways, and existing conditions.

Site and Project Overview:

The Carmel Valley is a visually scenic area, a quality appreciated by the community and protected by County policy. The project is located on an eight acre "infill" site with access from Val Verde Drive (north/south street) approximately 5 blocks inland or east of from Highway 1 at the mouth of Carmel Valley. Access is from Rio Road to the south of subject site. Roadways to the north are Carmel Valley Road (CVR) and Carmel Rancho Boulevard (CRB) to the west. There is no direct access from CVR or CRB. CVR is not a designated scenic highway.

The proposed minor-subdivision is an in-fill project with existing development on three sides. The site has residential and commercial development on three sides and open space on the eastern perimeter. There are no homes to the east. Further up-valley is Rancho Canada Golf Course which is approximately 750 feet to the east but there is an earthen barrier and trees and subject site. The golf course and golfing activities cannot be seen from the subject site. To the northeast approximately 1/2 mile (not an immediate neighbor or adjacent property) is the Carmel Middle School.

The site is located on Val Verde Drive, serviced by a 60' wide private road easement, with cross street access from Rio Road to the south. Between the subject site and Carmel River 1,400 feet to the south there are approximately 164 homes. Val Verde Drive is a private roadway servicing 6 single family homes, 5 lots, and provides emergency access for Cottages of Carmel to the north.

The site's history is residential and agricultural use. Changes associated with the proposed minor residential sub-division would result in changes to the visual character of the site. Changes in visual contrast are assessed from various public and private locations, are identified, photographed and photo simulations developed for visual simulation referencing.

Evaluation of potential aesthetic mitigation through planting of additional trees for screening purposes or contrast-reducing finishes on fences and residential buildings is not a part of this exercise.

Structures proposed to be placed at the project site will consist of 24 single family homes and 7 inclusionary units. The applicant is not asking for lot area coverage or building variances with the exception of the inclusionary lot that proposes seven units versus current zoning which allows four. While architectural designs have not been completed renderings of the inclusionary units and courtyard style single family home styles envisioned have been produced.

Visual Impacts Summation:

The infill development has immediate visual impacts to three existing residential neighbors and the commercial tenants who reside in the CRB buildings.

Public roadways visual impacts:

- North Elevation and View Corridor

CVR is approximately 1,300 to 1,900 feet to the north. There is approximately a 300 foot wide view corridor of the proposed project site from CVR in the vicinity of the Carmel Middle School when viewing north to south from CVR.

This is considered the "prime" public viewing corridor regarding potential controversy. There would be approximately a 35 degree view corridor of the eastern facades of 5 of the 24 proposed the single family homes that front Val Verde Drive. There are two existing tree groves within this 35 degree view corridor.

- South Elevation and View Corridor

Rio Road to the south is the east/west public access road for the project. The proposed site is not seen from Rio Road shielded by two existing homes and the Carmel Waste Water District commercial building to the south of the proposed development. Given no visibility from the public Rio Road this viewing area should not be controversial.

- East Elevation and View Corridor

There are no homes to the east. There is a vacant 5 acre lot that was previously entitled for a Community Center to the immediate east of the subject site. These entitlements have lapsed. Further "up valley" or to the east approximately 750' is the Rancho Canada Golf Course. The golf course and golfing activities cannot be seen from the subject site.

To the northeast approximately 1,200' is a Carmel Middle School cypress tree line. The School has two rows of Cypress Trees on its western and southern properties lines that shield the subject property from the School and CVR. The school buildings cannot be seen from the subject site. Given no residential or commercial buildings to the east this view corridor should not be controversial.

- West Elevation and View Corridor

Carmel Rancho Boulevard (CRB) is a north/south public street to the west of the subject site. This street provides access to 11 commercial properties of which 6 vertical commercial buildings share a common property line with the subject site. There are three views corridors approximately 50' wide between vertical commercial buildings as seen from CRB or the Barnyards Shopping Center to the west of the subject site. The bulk of the residential homes will be screened by the vertical commercial structures along CRB. Visual impacts from public viewing areas along CRB or from the Barnyard are negligible.

Future residential project when viewed from Public areas and roadways - Existing Conditions:

- North Property Line Elevation - as viewed from Carmel Valley Road (CVR): To the north of the project site there is a 77 bed assisted care Cottages of Carmel facilities which is adjacent to CVR, several commercial buildings on the site referred to as "Britons", and two residential homes.

Pre and Post Construction - View changes from Public Roadways:

Findings: View of the infill project from CVR looking north to south given development on three sides is limited to a northeast to southwest view corridor on CVR of approximately 300' wide at the intersection of CVR and the Carmel Middle School area. The project is approximately 1,300 to 1,900 feet from CVR (north and south property corners from CVR). The "view corridor" of the development from CVR would be approximately a 35 degree (angled) view of the east elevation facades of the 5 homes facing Val Verde Drive.

- South Property Line Elevation - as viewed from Rio Road: Two Residential homes and Carmel Area Waste Water District commercial building to the south as viewed from Rio Road

Pre and Post Construction - View changes:

Findings: Pre and Post construction the same view from Rio Road i.e., project is not seen from any pubic roadway or area along Rio Road.

- East Property Line Elevation (up valley): No homes but Carmel Middle School is approximately 1/2 mile to the northeast

Pre and Post Construction - View changes:

Findings: No residential homes to the east. Closest "neighbors to the east" are Rancho Canada Golf Course and Carmel Middle School. The golf course and related activities (750' to east) cannot be seen from the subject site. The Middle School has a line of Cypress trees on its western and southern property lines that block viewing from the NE when looking to the SW if standing on CVR. The Middle School buildings are not visible when viewed from the subject site.

- West Property Line Elevation - as viewed from Carmel Rancho Boulevard or Barnyard Shopping Center

Pre and Post Construction - View changes:

They are 11 vertical commercial buildings and the Briton's Commercial district to the west and northwest of the subject site. There are 3 filtered view corridors between the commercial buildings approximately 50' wide when viewed from CRB or the Barnyard Shopping Center.

Deliverables - Visual Impact Studies:

1) Carmel Valley Road - north to south view - to project site.

2) Val Verde Drive - south to north view - reflecting new roadway and the homes situated along the eastern property line.

3) Barnyard Shopping Center - west to east view - from Clock Tower Lane looking across Carmel Rancho Blvd. Filtered view between the commercial buildings.

4) Site Plans - East to West orientation.

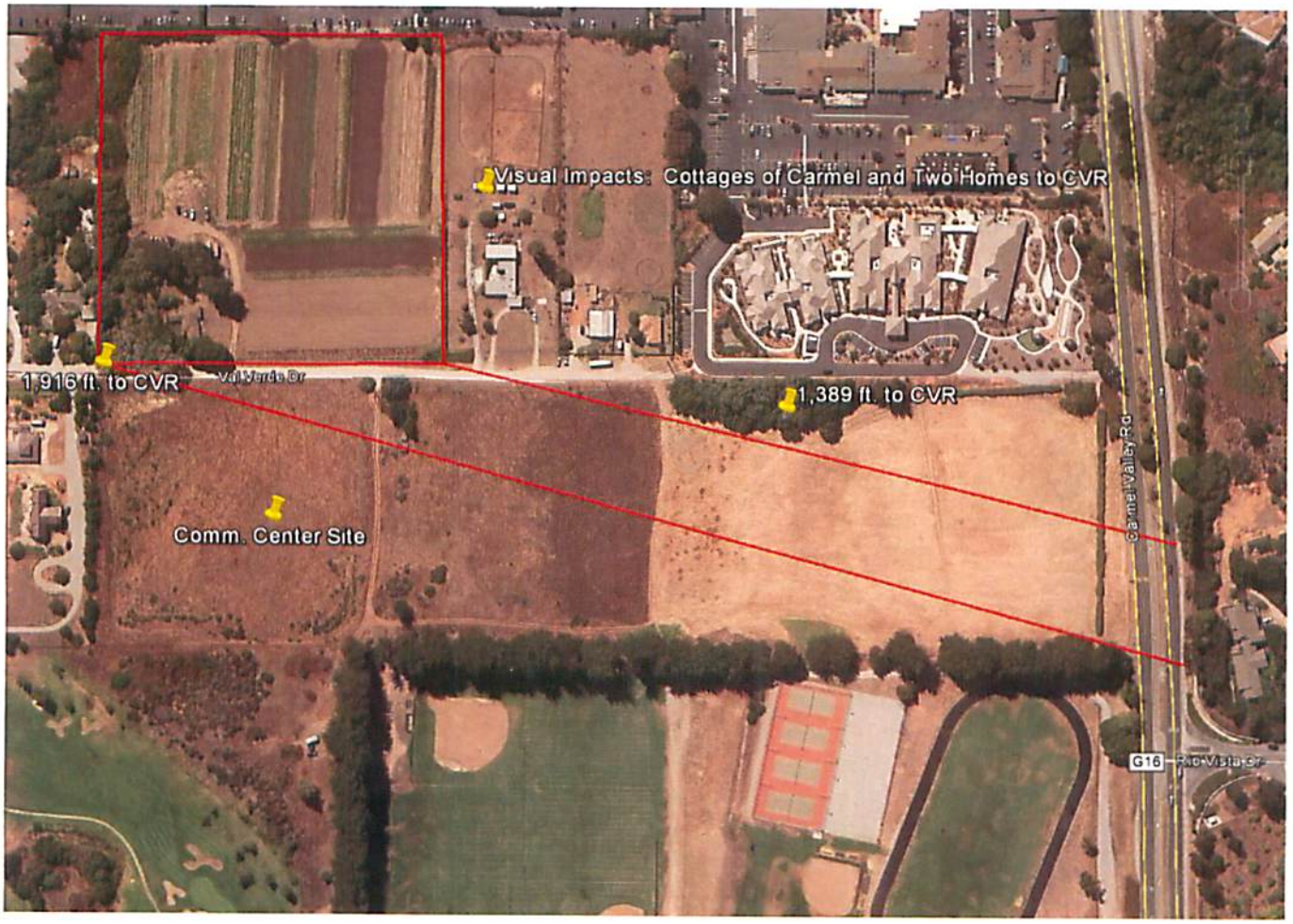
Elevation Studies:

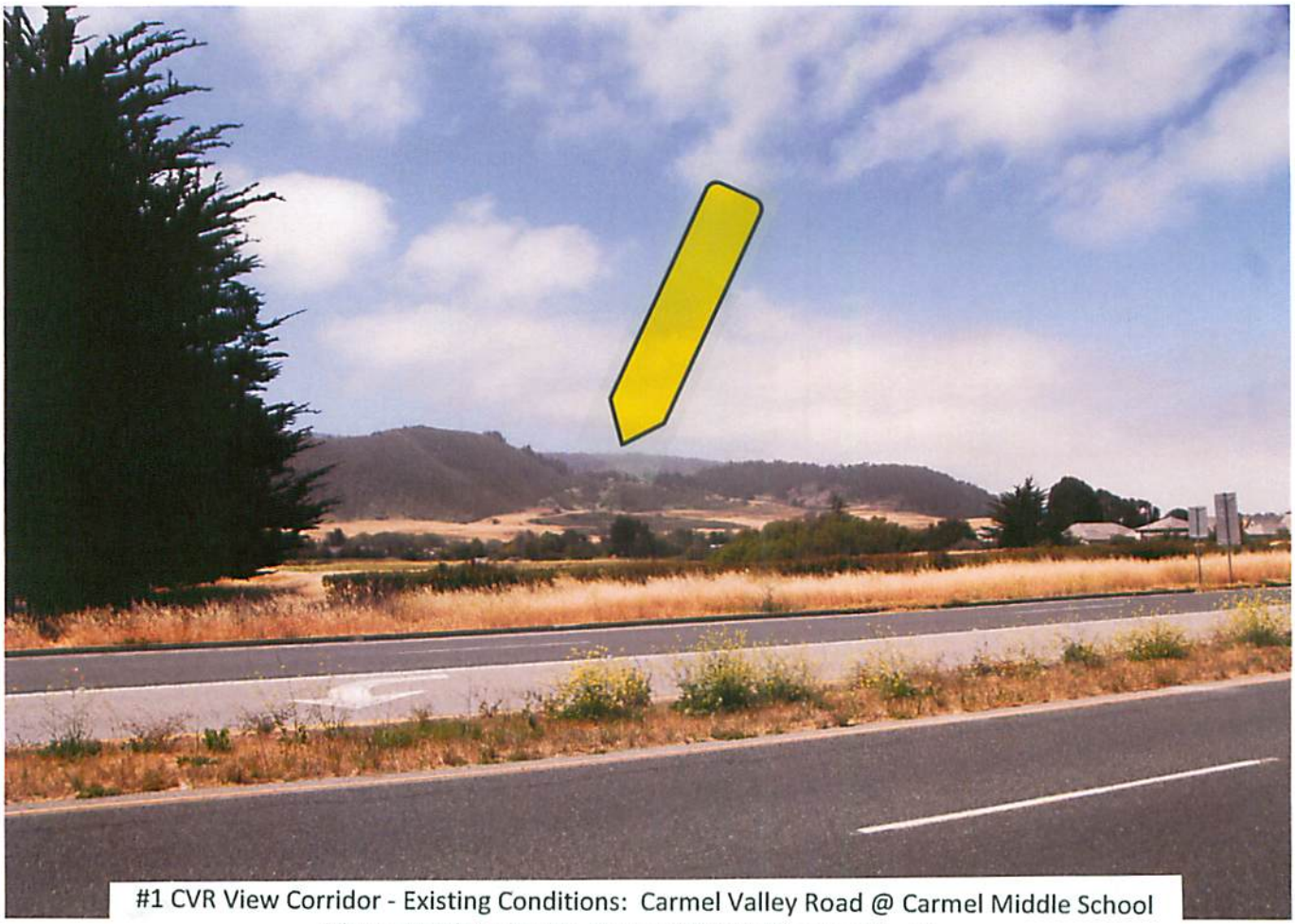
1) North, South, East & West

Architectural Renderings - Conceptual:

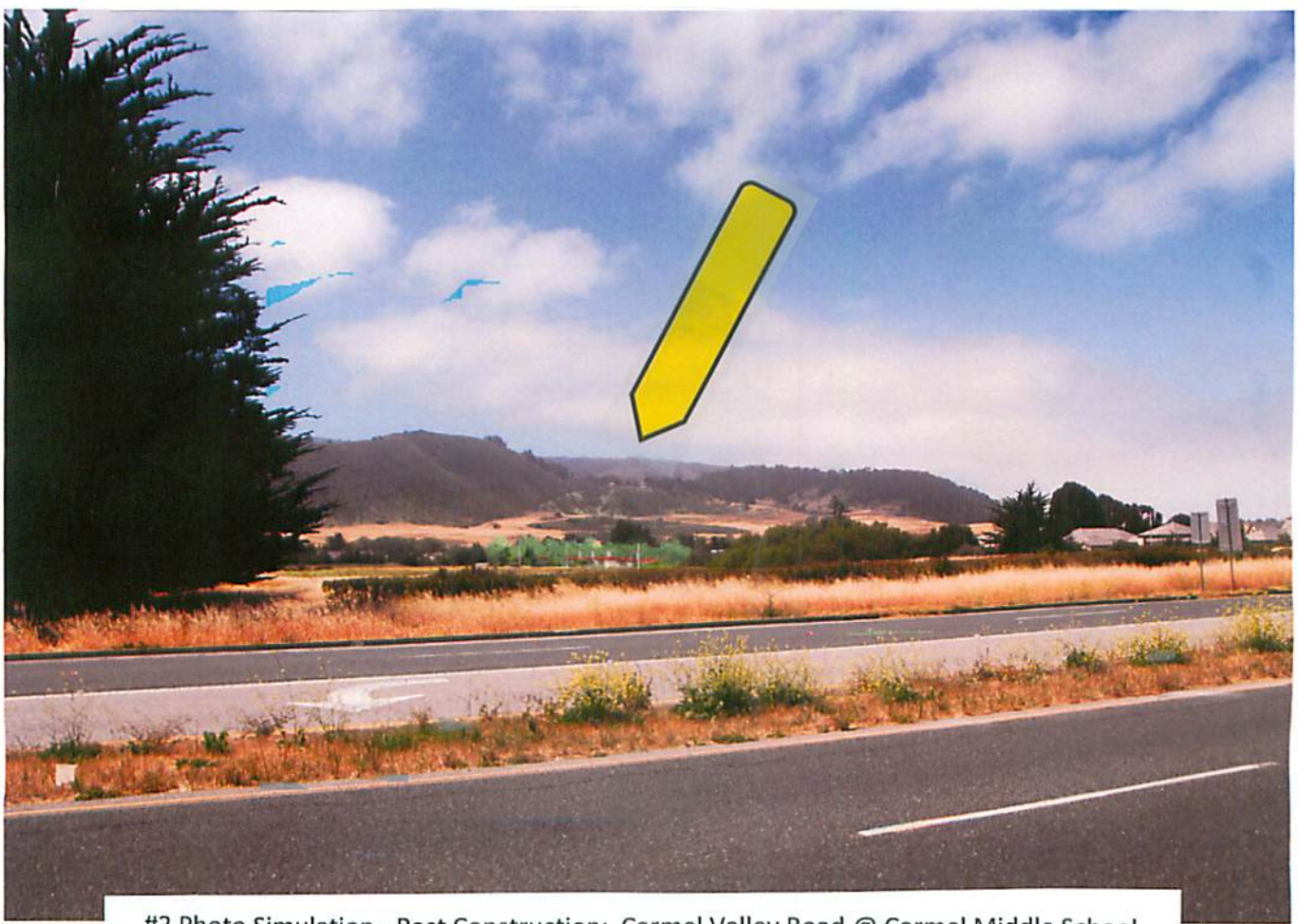
1) Affordable Units (7) and Courtyard Market Rate Style Homes (24)

Photo Simulation - North Elevation





#1 CVR View Corridor - Existing Conditions: Carmel Valley Road @ Carmel Middle School
View: North to South - Primary Public Viewing Corridor



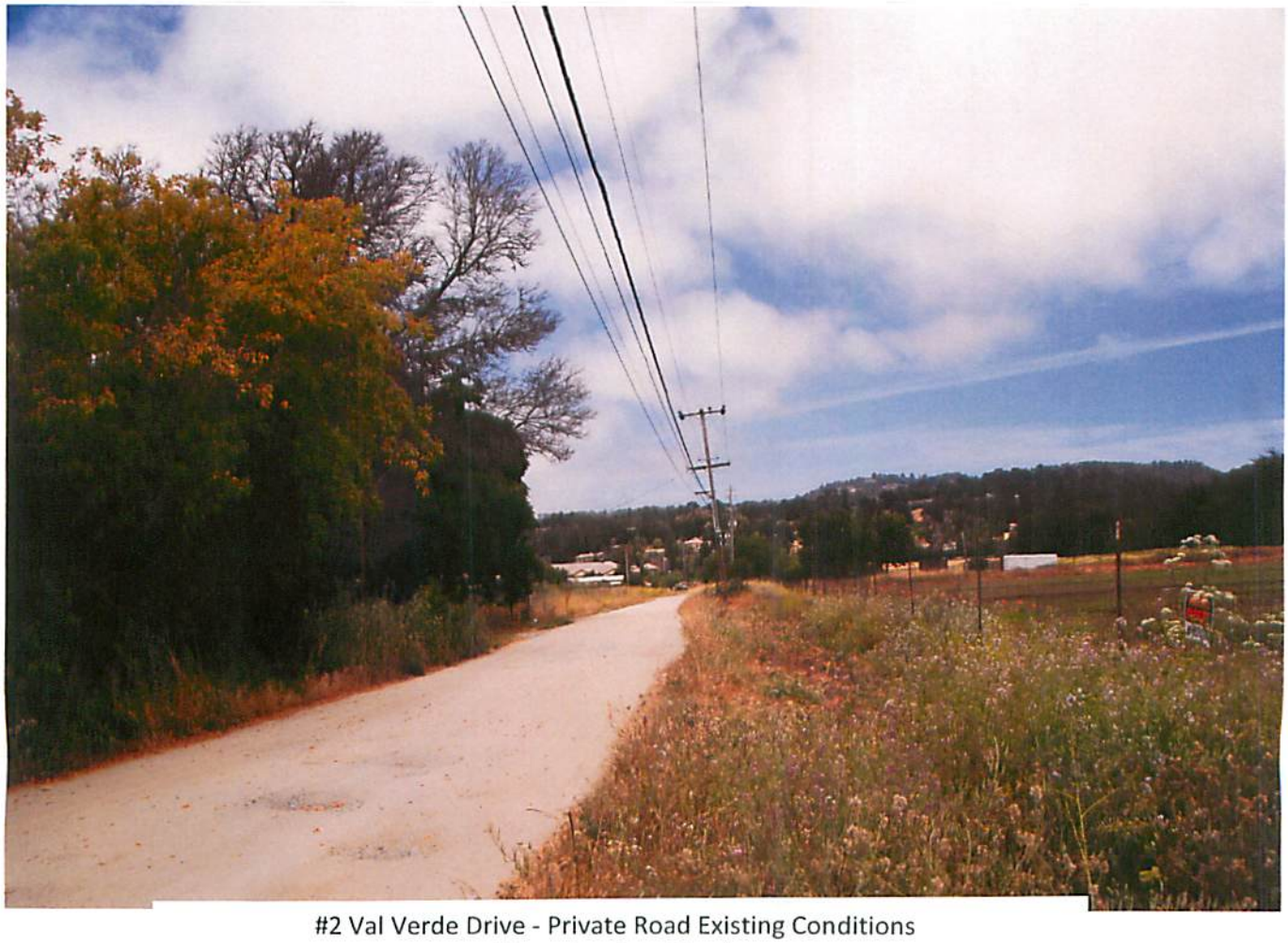
#2 Photo Simulation - Post Construction: Carmel Valley Road @ Carmel Middle School
View: North to South - Primary Public Viewing Corridor

Aerial View Corridor: Carmel Valley Road @ Carmel Middle School
View: North to South - Primary Public Viewing Corridor approximately 300' Wide

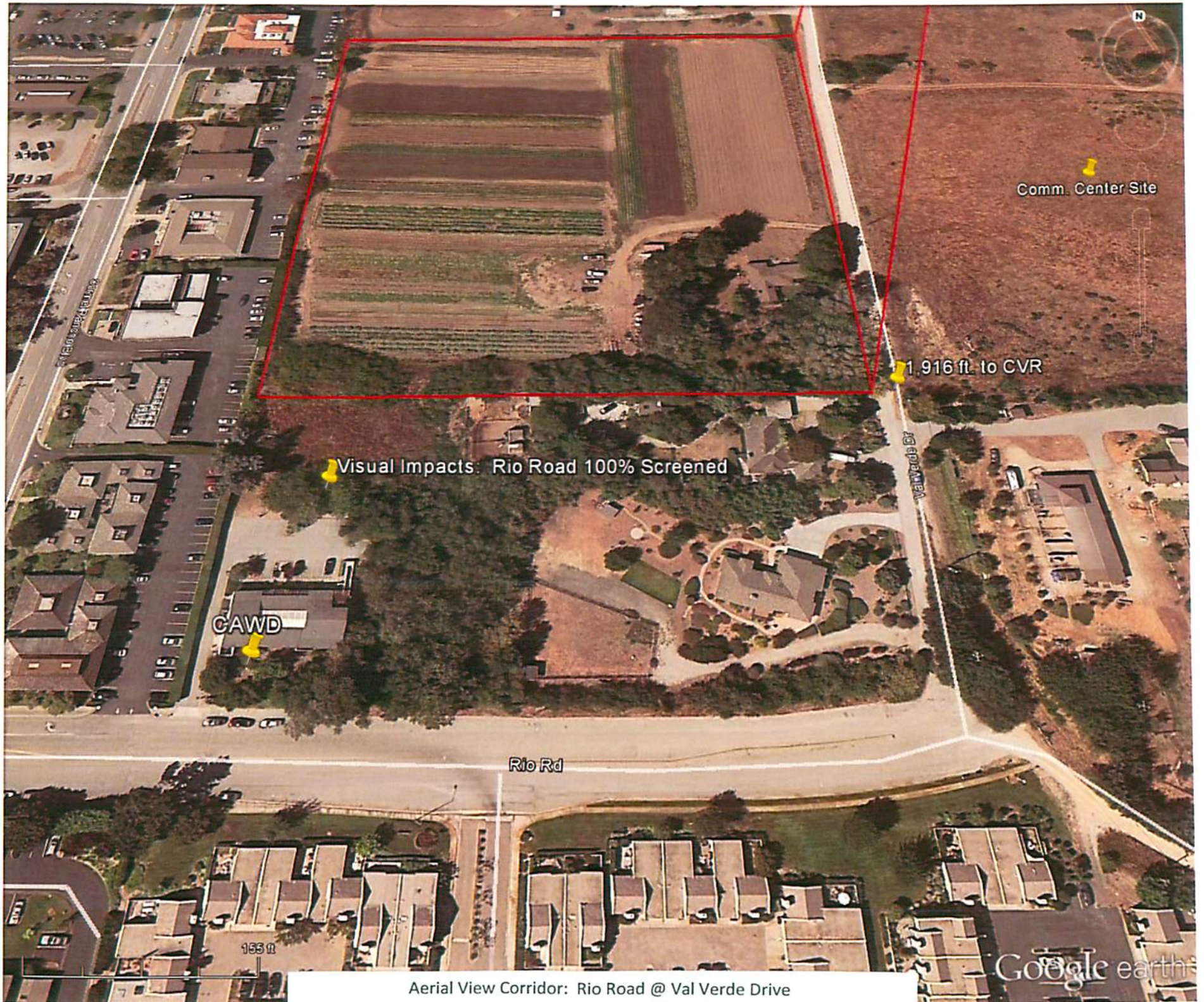
Aerial View Corridor - Enlarged Perspective: Carmel Valley Road @ Carmel Middle School
View: North to South - Primary Public Viewing Corridor approximately 300' Wide

Photo Simulation - South Elevation

#1 Photo Simulation - Post Construction: New Private Road with Five Homes
View: South to North (CVR 1,900' North)

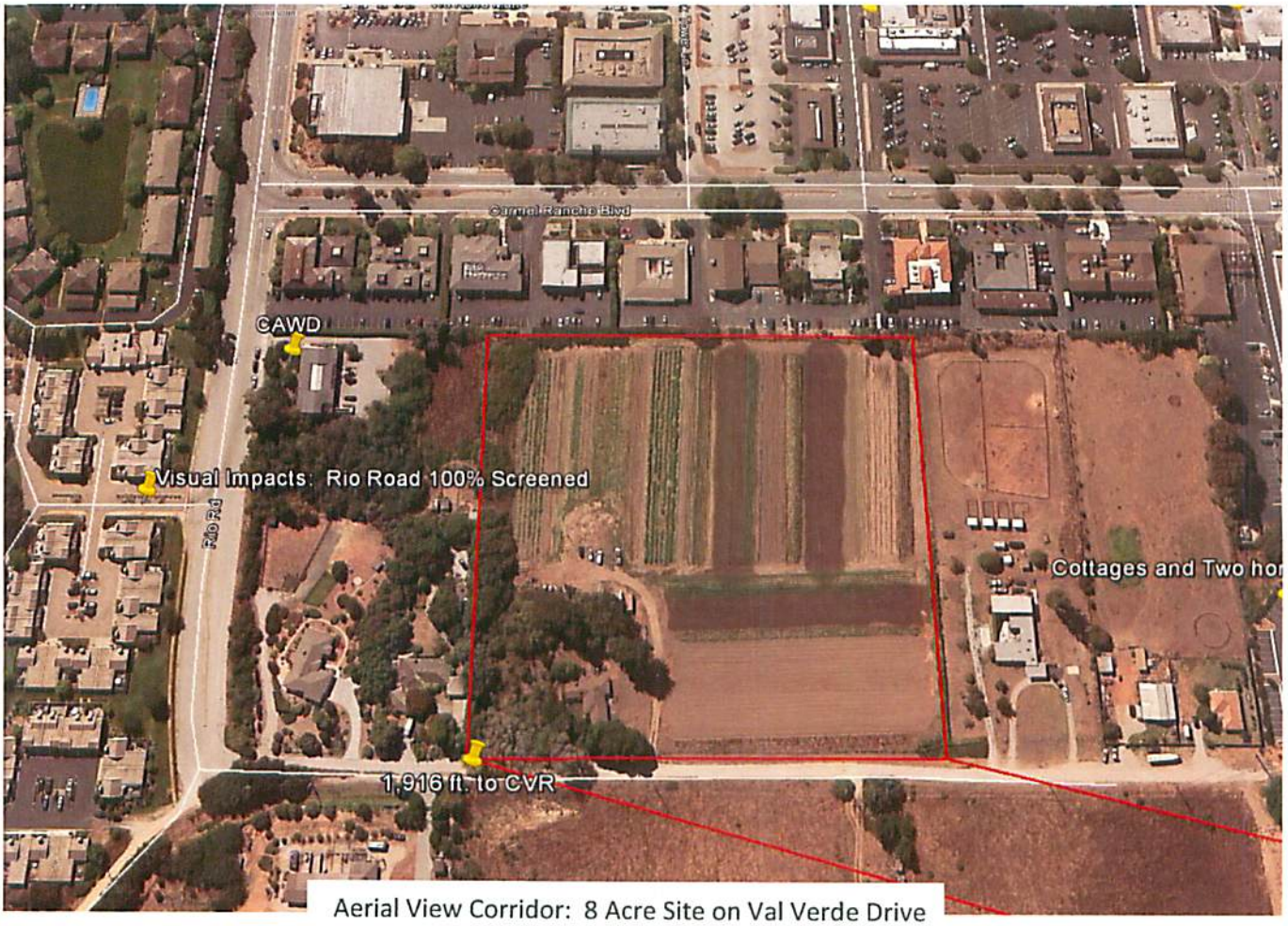


#2 Val Verde Drive - Private Road Existing Conditions
View: South to North

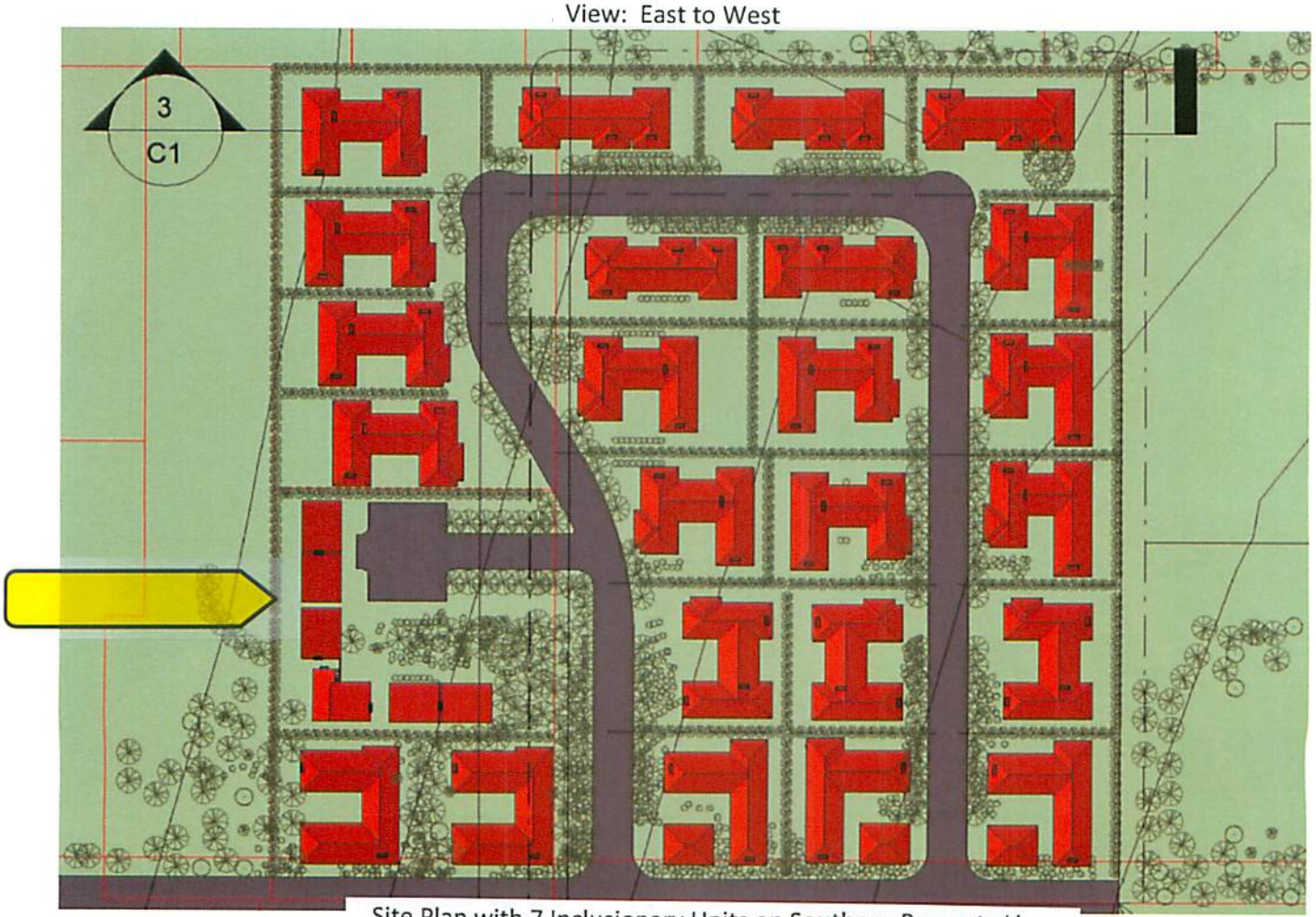


Aerial View Corridor: Rio Road @ Val Verde Drive
View: South to North

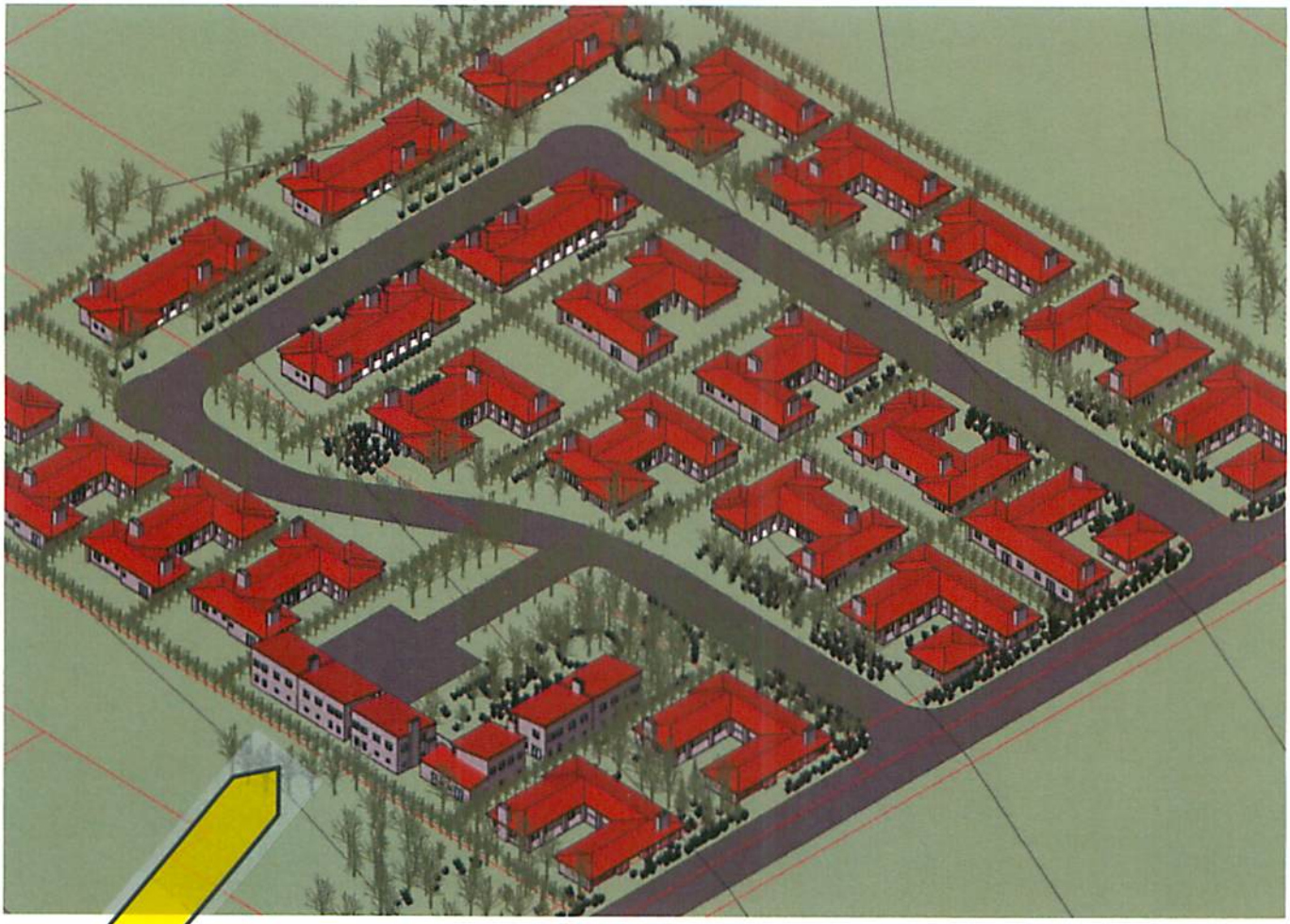
Photo Simulation - East Elevation & Site Plan
Inclusionary Housing



Aerial View Corridor: 8 Acre Site on Val Verde Drive
View: East to West

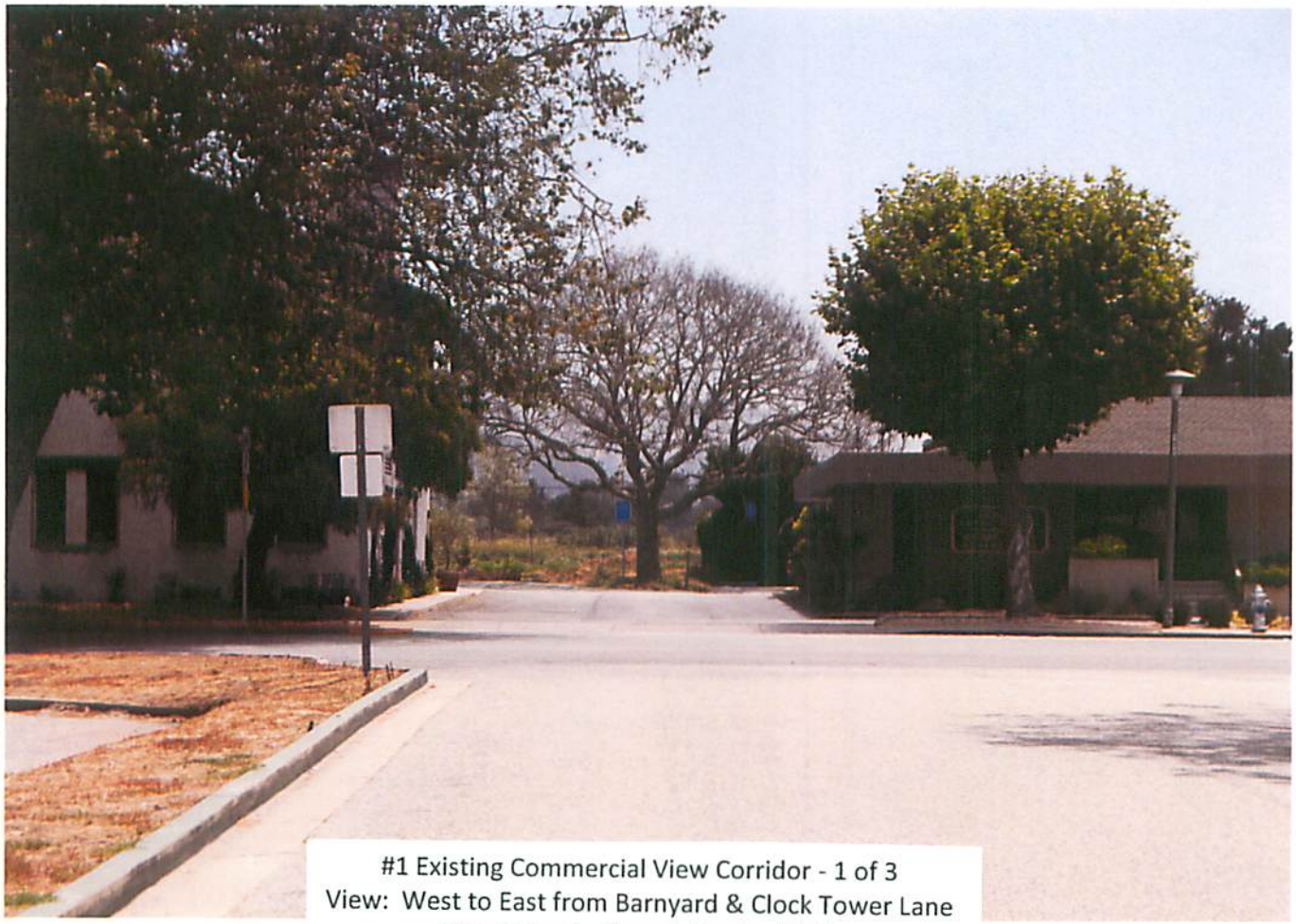


Site Plan with 7 Inclusionary Units on Southern Property Line
with 24 Single Family Homes



Site Plan with 7 Inclusionary Units & 24 Single Family Homes

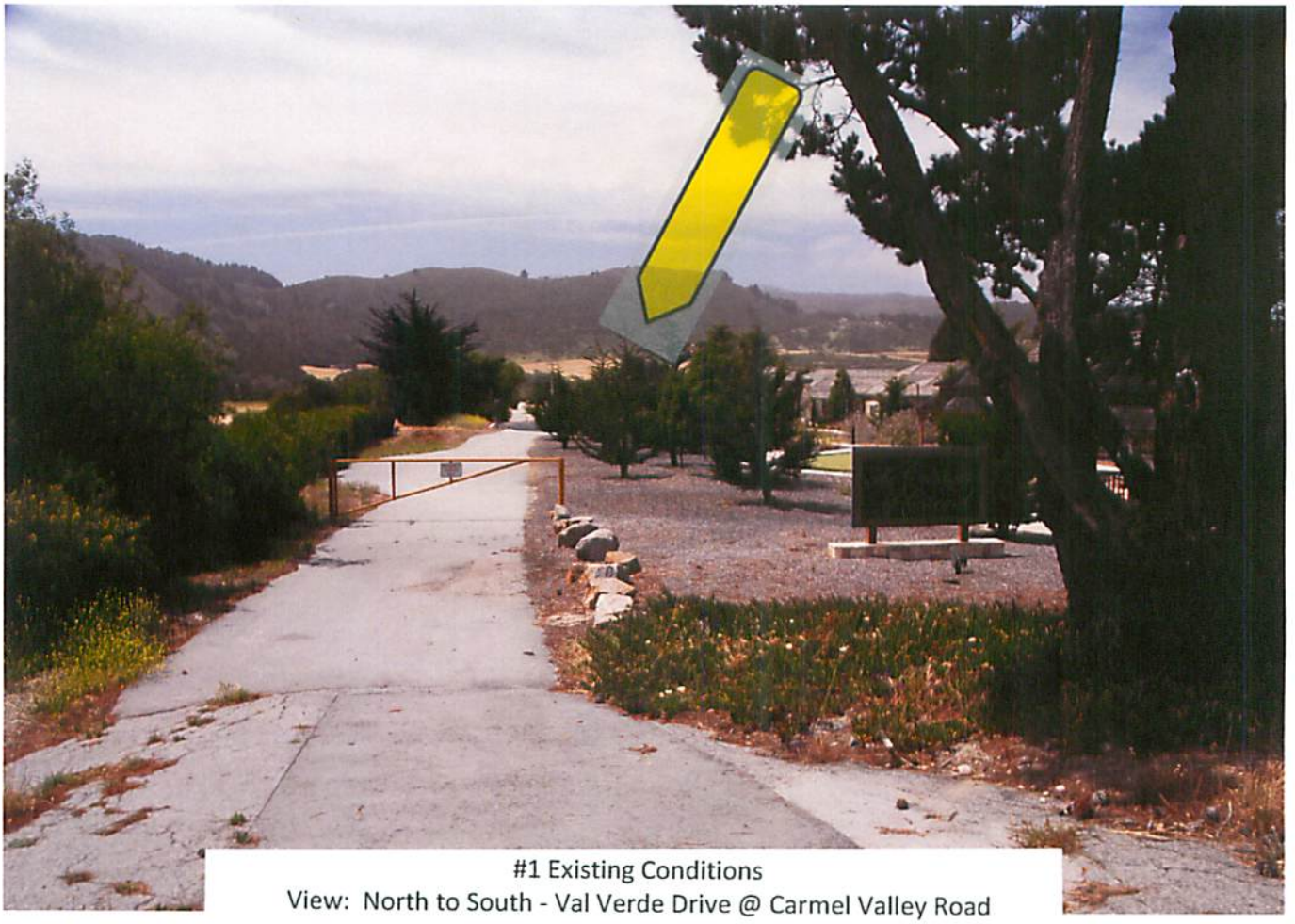
Photo Simulation - West Elevation



#1 Existing Commercial View Corridor - 1 of 3
View: West to East from Barnyard & Clock Tower Lane
Cross Street: Carmel Rancho Blvd.

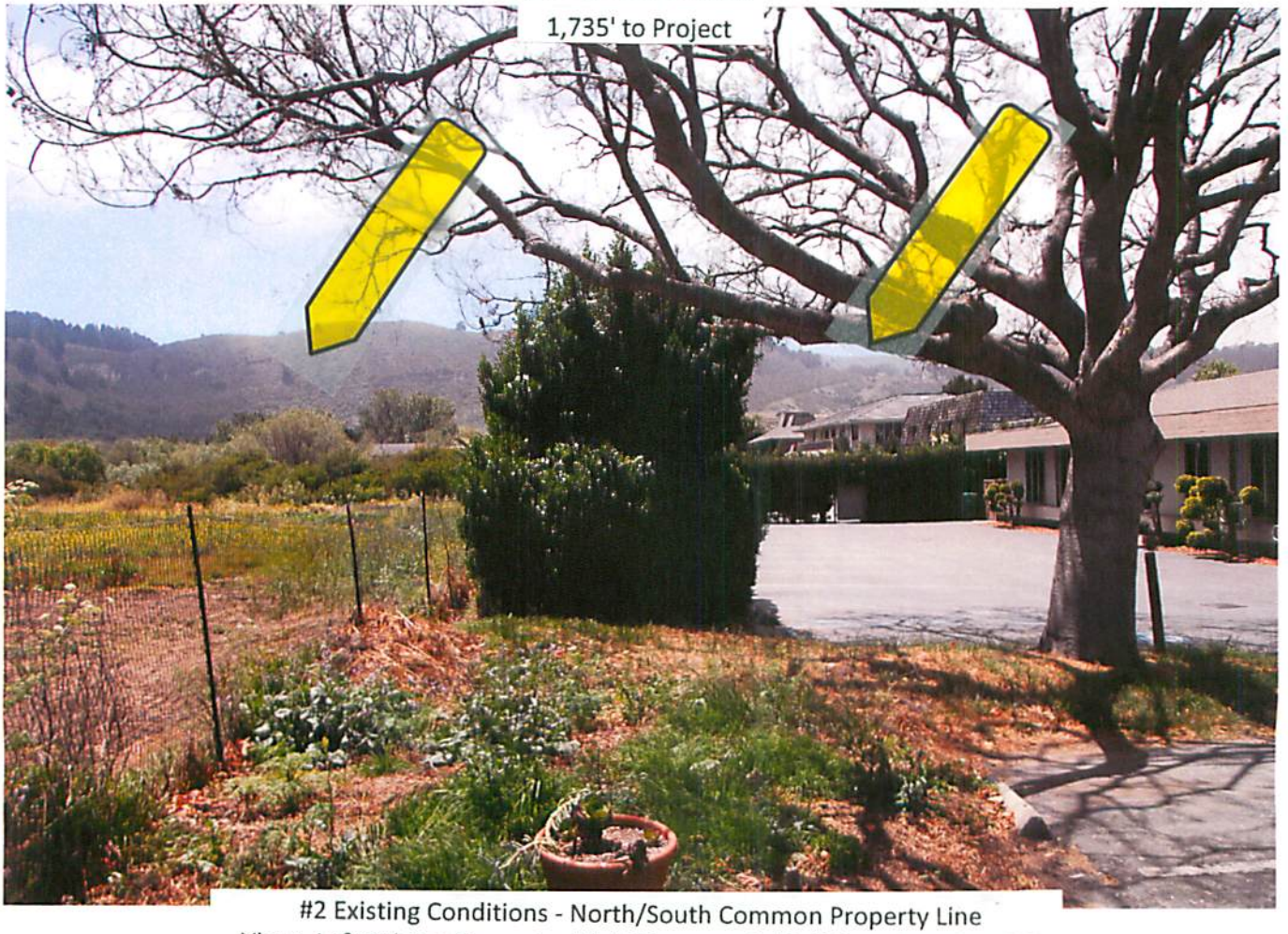
#2 Photo Simulation - Commercial View Corridor
View: West to East from Barnyard & Clock Tower Lane

Aerial Site View - West Elevation looking East



#1 Existing Conditions
View: North to South - Val Verde Drive @ Carmel Valley Road
(Cottages of Carmel)

1,735' to Project



#2 Existing Conditions - North/South Common Property Line
View: Left Subject Property - Right Commercial Buildings Fronting CRB

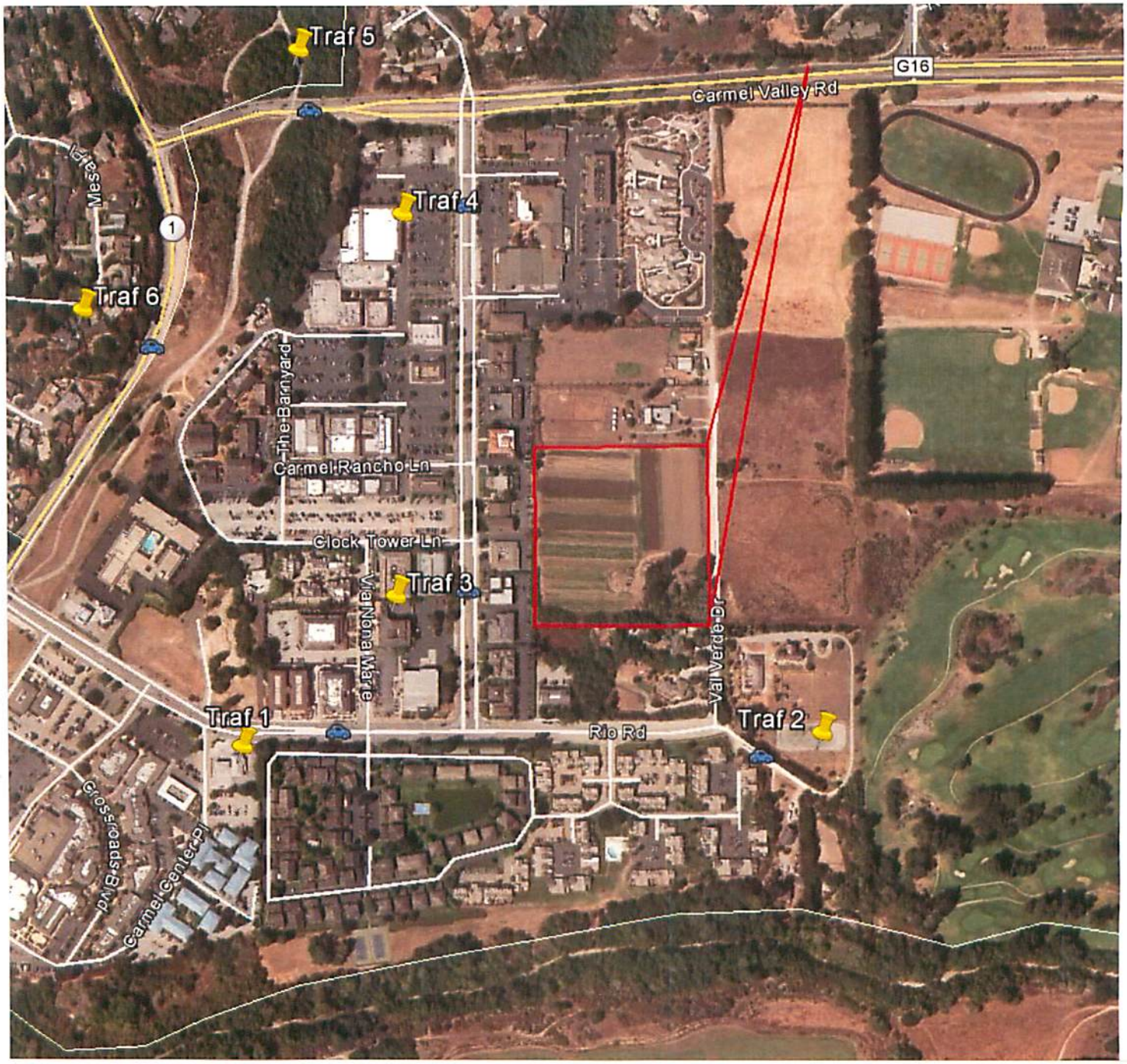
Aerial Site View #1 - North Elevation looking South

Existing North Elevation & Visual Impact Study

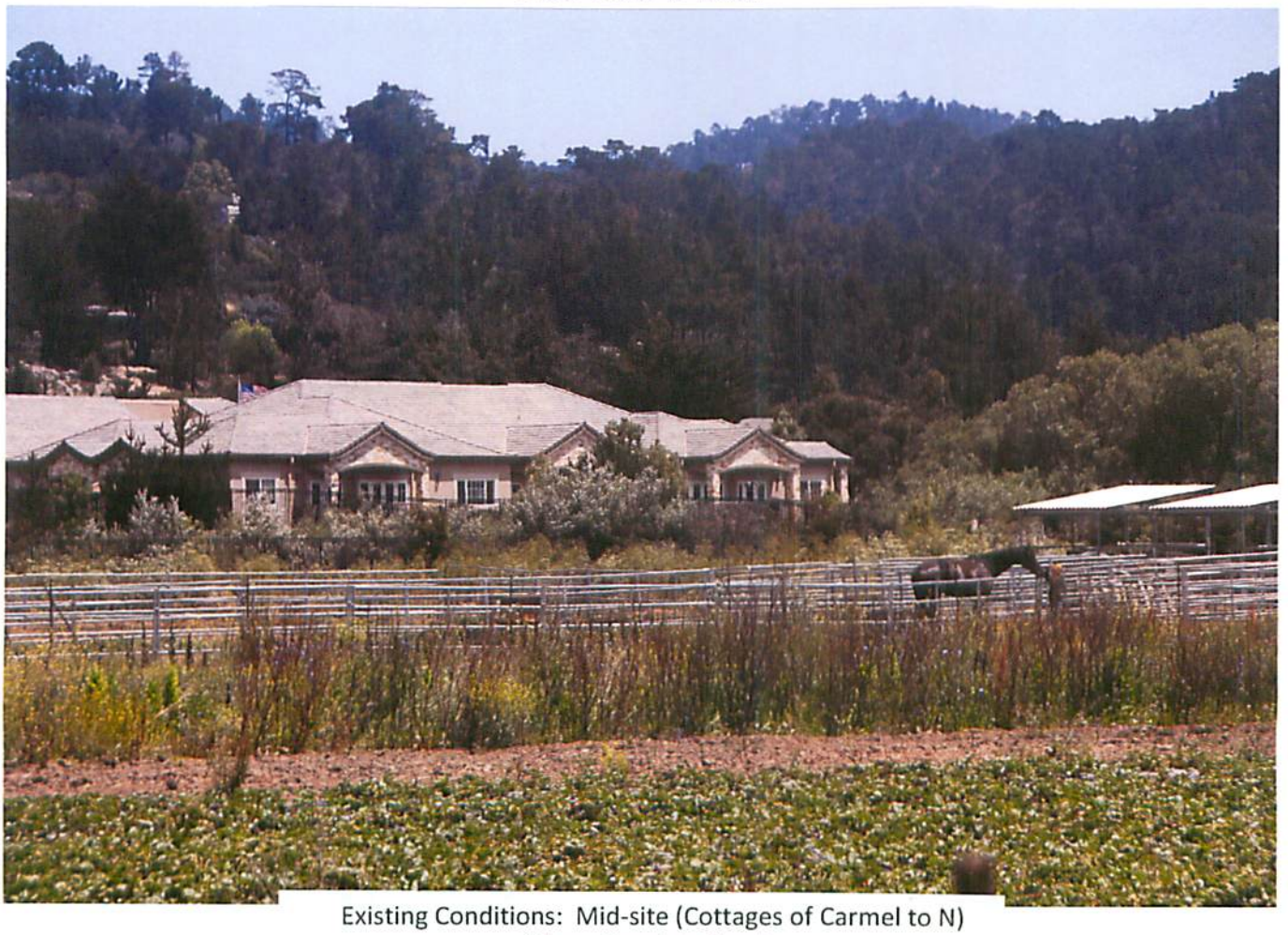
Aerial Site View #2 - North Elevation looking South

Aerial Site View #3 - North Elevation looking South

Existing South Elevation & Visual Impact Study



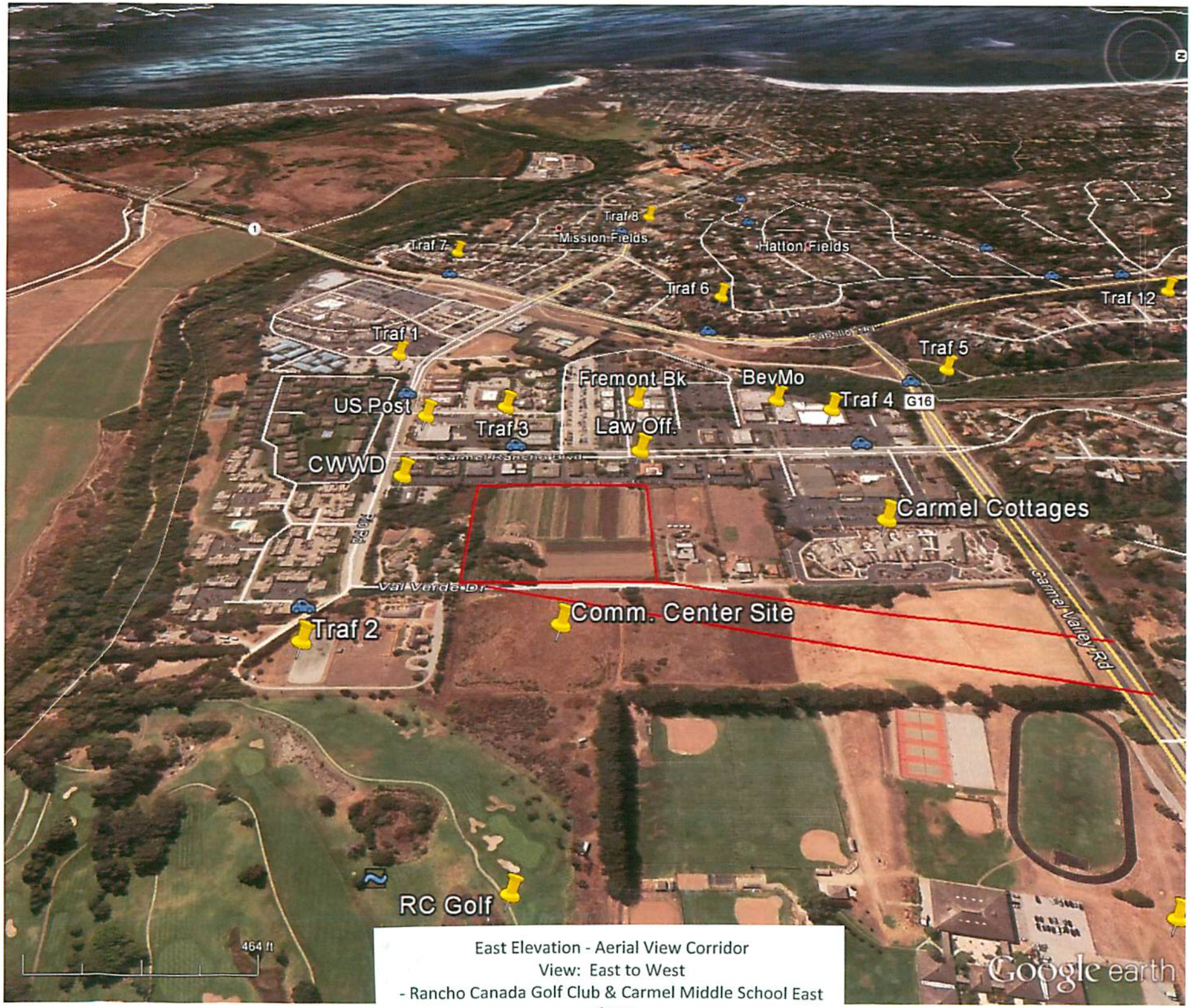
Aerial View Corridor: Rio Road @ Val Verde Drive
View: South to North



Existing Conditions: Mid-site (Cottages of Carmel to N)
View: South to North

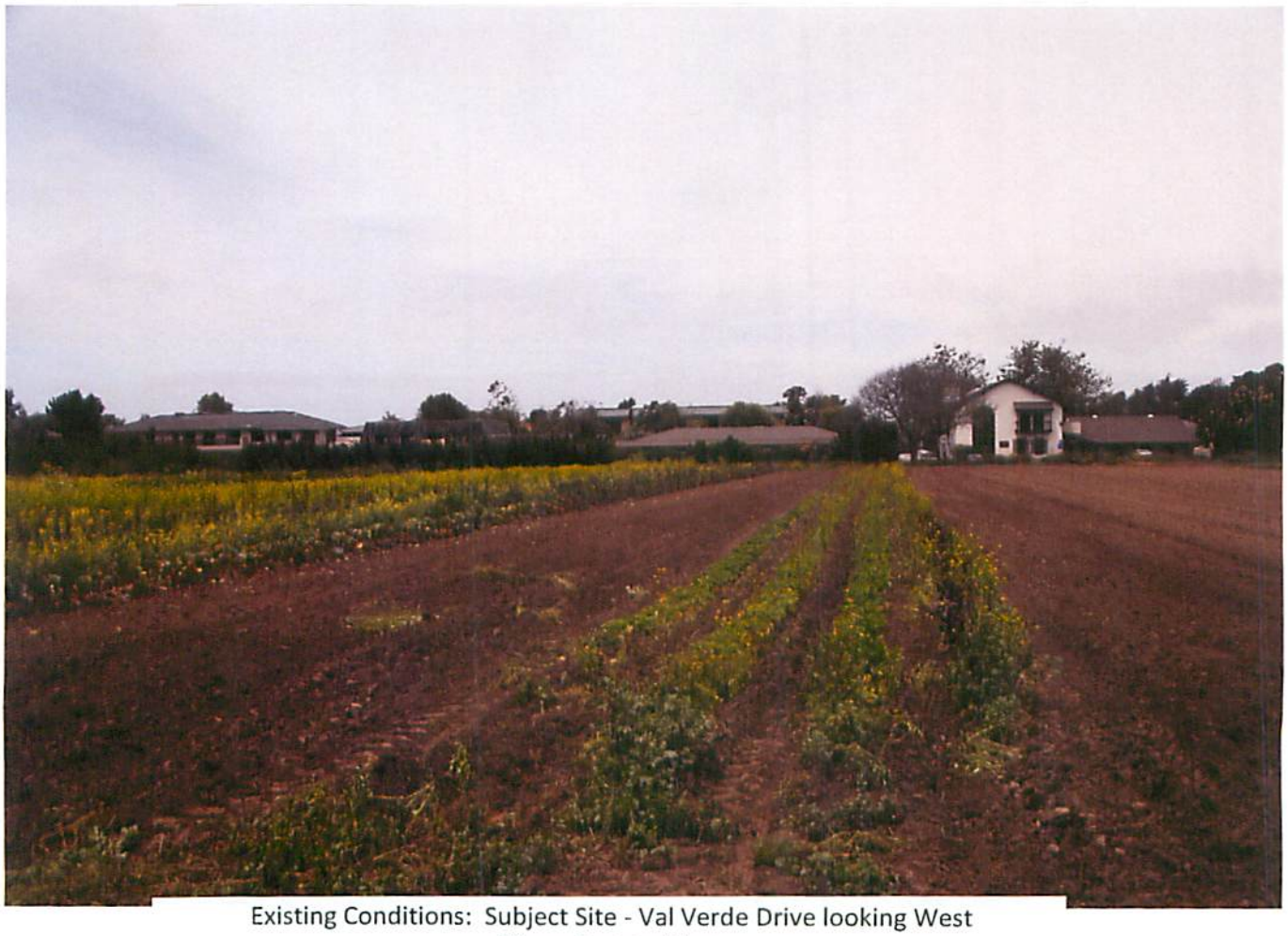
Existing East Elevation & Visual Impact Study

BevMo
Cottages and Two homes Screen from CVR
1,389 ft. to CVR
Fremont Bk
Carmel Rancho Ln
Clock Tower Ln
Carmel Rancho Blvd
Via Nogue Marie
Comm. Center Site
1,916 ft. to CVR
Visual Impacts: Rio Road 100% Screened from Site
CAWD
Rio Rd
334 ft
© 2014 Google
G18
N
Aerial View Corridor: Rio Road @ Val Verde Drive
View: South to North
- Cottages of Carmel to N
- Carmel Area Wastewater District Offices & 164 Homes S
- Open lots, Rancho Canada & Middle School E
- Commercial & Barnyard to W



East Elevation - Aerial View Corridor
View: East to West
- Rancho Canada Golf Club & Carmel Middle School East of Site

Existing Conditions: Western Commercial District (Common Property Line)
View: East to West



Existing Conditions: Subject Site - Val Verde Drive looking West
View: East to West

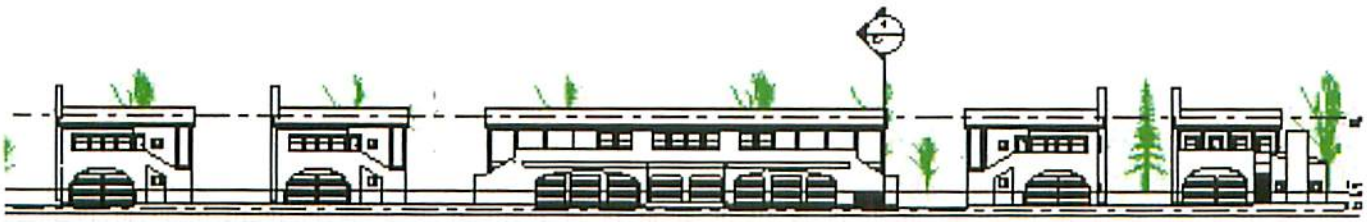
Existing West Elevation & Visual Impact Study

West Elevation Existing Conditions - Aerial View Corridor
View: West to East
- US Post Office, Commercial District & Barnyard West of Site

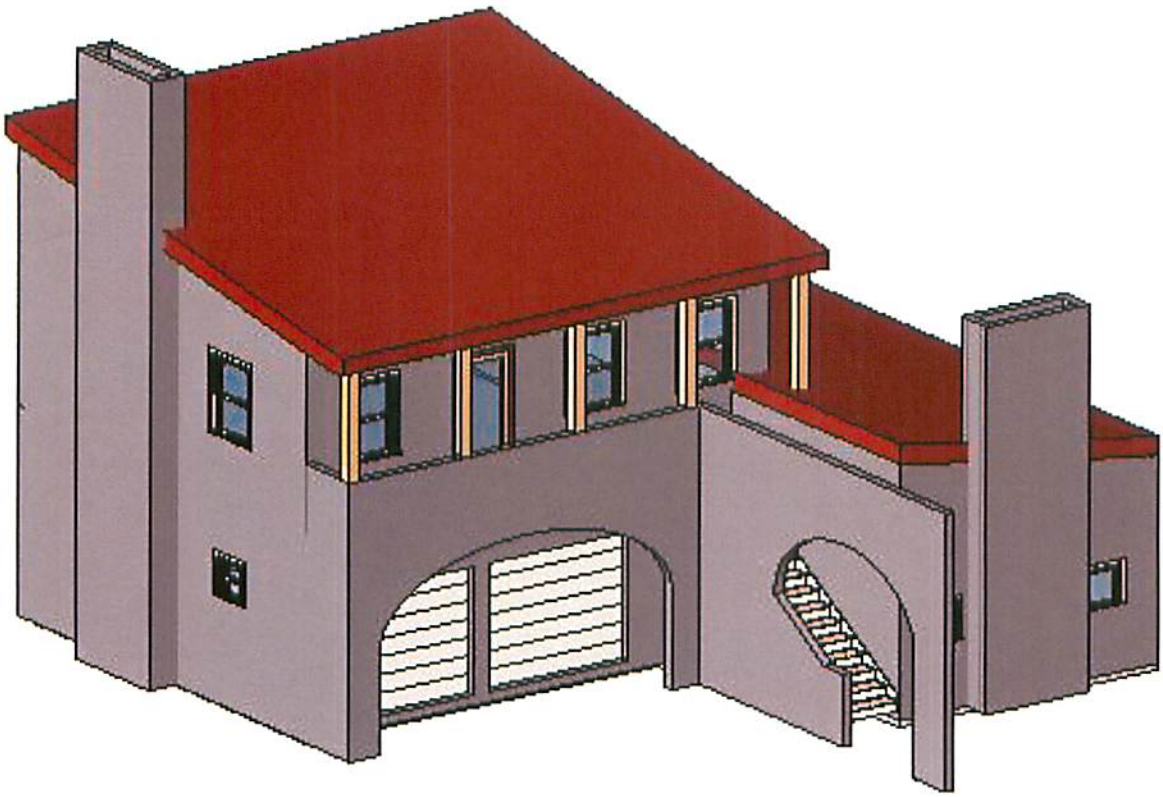
Architectural Renderings
Inclusionary (7) and Market Rate Courtyard Style Homes (24)

#1 Architectural Renderings - Inclusionary Units (7)
(colors not selected at this time)

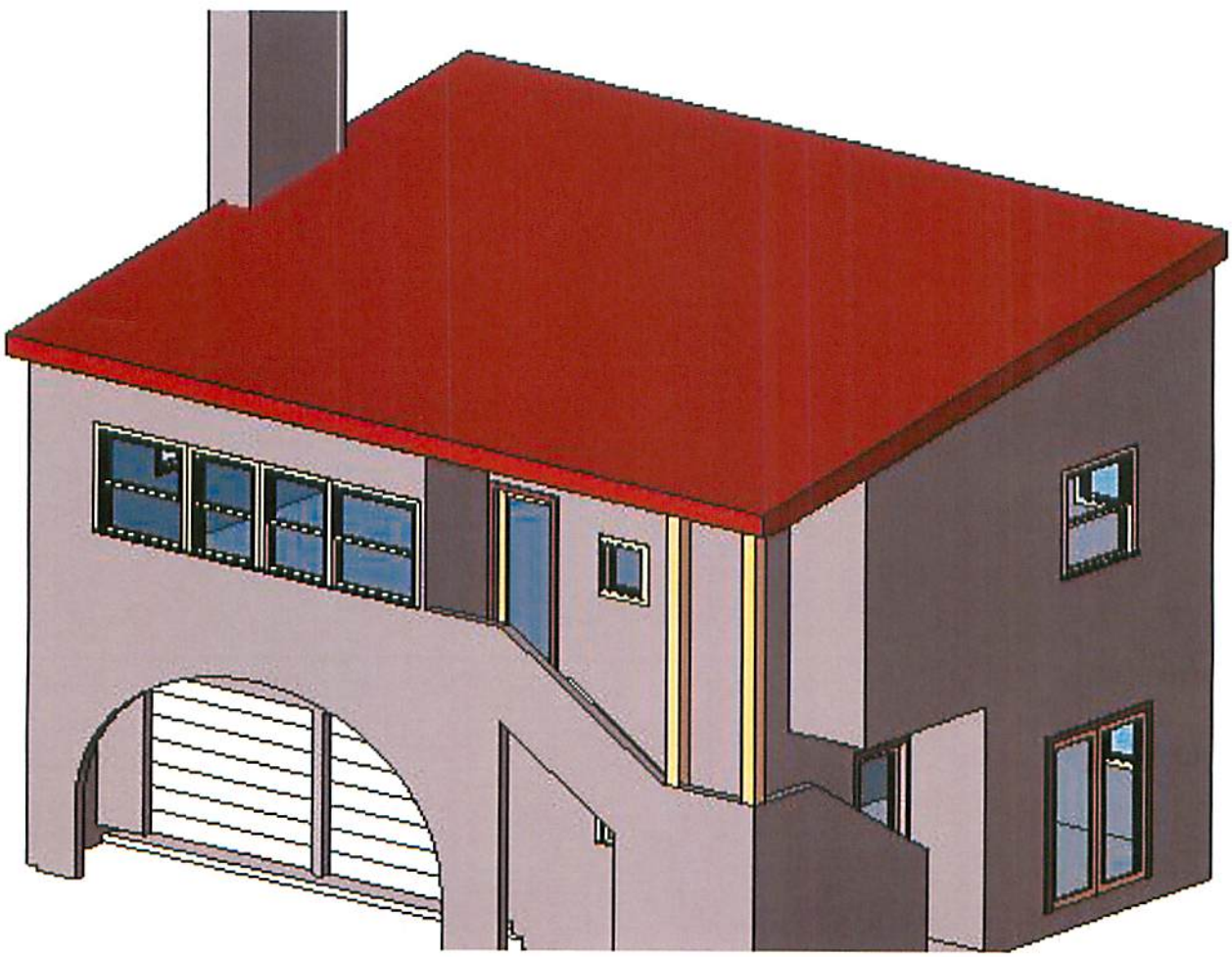
Conceptual



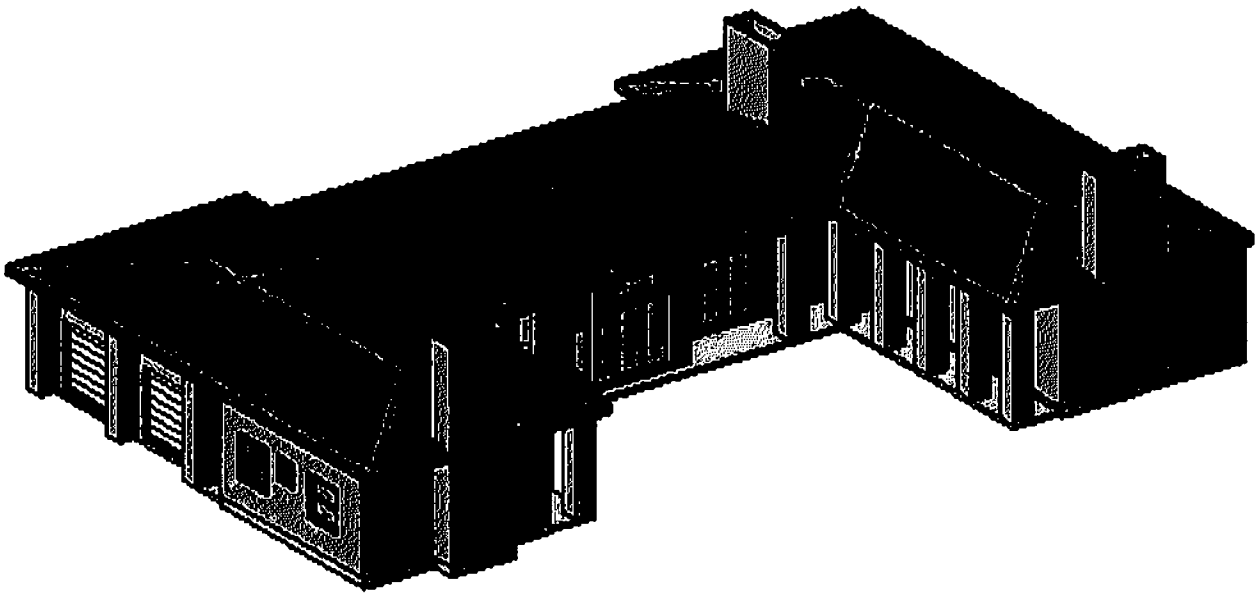
#2 Architectural Renderings - Inclusionary Units (7)
(colors not selected at this time)



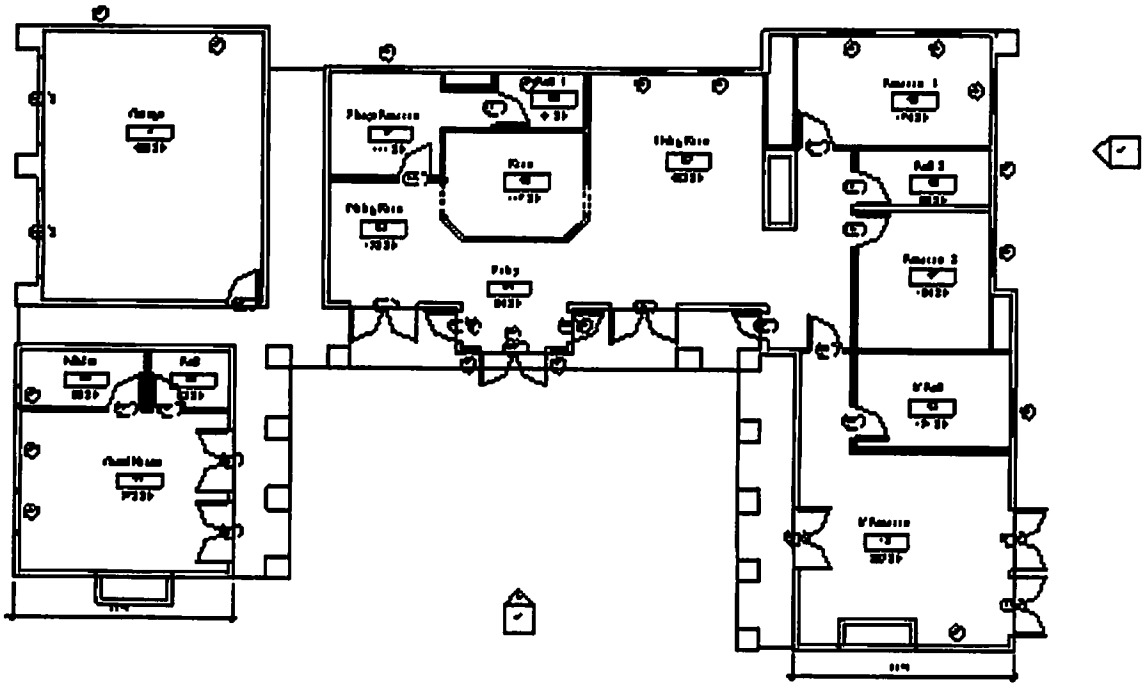
Conceptual



#3 Architectural Renderings - Courtyard Homes (24)
(colors not selected at this time)



Conceptual



Appendix C

Air Quality

Appendix C-1

Modeling Results

Carmel Rio Existing

North Central Coast Air Basin, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Single Family Housing	1.00	Dwelling Unit	0.32	1,800.00	3

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.8	**Precipitation Freq (Days)**	53
Climate Zone	3			**Operational Year**	2019
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Table Name	Column Name	Default Value	New Value
tblProjectCharacteristics	OperationalYear	2014	2019

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2016	0.1100	0.7928	0.4964	6.9000e-004	1.8700e-003	0.0544	0.0563	6.7000e-004	0.0503	0.0509	0.0000	64.2949	64.2949	0.0184	0.0000	64.6805
Total	**0.1100**	**0.7928**	**0.4964**	**6.9000e-004**	**1.8700e-003**	**0.0544**	**0.0563**	**6.7000e-004**	**0.0503**	**0.0509**	**0.0000**	**64.2949**	**64.2949**	**0.0184**	**0.0000**	**64.6805**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2016	0.1100	0.7928	0.4964	6.9000e-004	1.8700e-003	0.0544	0.0563	6.7000e-004	0.0503	0.0509	0.0000	64.2948	64.2948	0.0184	0.0000	64.6804
Total	**0.1100**	**0.7928**	**0.4964**	**6.9000e-004**	**1.8700e-003**	**0.0544**	**0.0563**	**6.7000e-004**	**0.0503**	**0.0509**	**0.0000**	**64.2948**	**64.2948**	**0.0184**	**0.0000**	**64.6804**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0728	9.4000e-004	0.0848	3.0000e-005		0.0109	0.0109		0.0109	0.0109	1.0330	0.4453	1.4783	9.7000e-004	8.0000e-005	1.5238
Energy	1.7000e-004	1.4400e-003	6.1000e-004	1.0000e-005		1.2000e-004	1.2000e-004		1.2000e-004	1.2000e-004	0.0000	3.9018	3.9018	1.3000e-004	5.0000e-005	3.9206
Mobile	6.7900e-003	0.0181	0.0787	1.6000e-004	0.0103	2.3000e-004	0.0105	2.7500e-003	2.2000e-004	2.9700e-003	0.0000	11.5787	11.5787	5.4000e-004	0.0000	11.5900
Waste						0.0000	0.0000		0.0000	0.0000	0.2680	0.0000	0.2680	0.0158	0.0000	0.6005
Water						0.0000	0.0000		0.0000	0.0000	0.0207	0.1444	0.1651	2.1300e-003	5.0000e-005	0.2257
Total	**0.0798**	**0.0205**	**0.1641**	**2.0000e-004**	**0.0103**	**0.0113**	**0.0215**	**2.7500e-003**	**0.0112**	**0.0140**	**1.3216**	**16.0702**	**17.3918**	**0.0196**	**1.8000e-004**	**17.8605**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0728	9.4000e-004	0.0848	3.0000e-005		0.0109	0.0109		0.0109	0.0109	1.0330	0.4453	1.4783	9.7000e-004	8.0000e-005	1.5238
Energy	1.7000e-004	1.4400e-003	6.1000e-004	1.0000e-005		1.2000e-004	1.2000e-004		1.2000e-004	1.2000e-004	0.0000	3.9018	3.9018	1.3000e-004	5.0000e-005	3.9206
Mobile	6.7900e-003	0.0181	0.0787	1.6000e-004	0.0103	2.3000e-004	0.0105	2.7500e-003	2.2000e-004	2.9700e-003	0.0000	11.5787	11.5787	5.4000e-004	0.0000	11.5900
Waste						0.0000	0.0000		0.0000	0.0000	0.2680	0.0000	0.2680	0.0158	0.0000	0.6005
Water						0.0000	0.0000		0.0000	0.0000	0.0207	0.1444	0.1651	2.1300e-003	5.0000e-005	0.2257
Total	**0.0798**	**0.0205**	**0.1641**	**2.0000e-004**	**0.0103**	**0.0113**	**0.0215**	**2.7500e-003**	**0.0112**	**0.0140**	**1.3216**	**16.0702**	**17.3918**	**0.0196**	**1.8000e-004**	**17.8605**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2016	1/14/2016	5	10	
2	Site Preparation	Site Preparation	1/15/2016	1/15/2016	5	1	
3	Grading	Grading	1/16/2016	1/19/2016	5	2	
4	Building Construction	Building Construction	1/20/2016	6/7/2016	5	100	
5	Paving	Paving	6/8/2016	6/14/2016	5	5	
6	Architectural Coating	Architectural Coating	6/15/2016	6/21/2016	5	5	

Acres of Grading (Site Preparation Phase): 0.5

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 3,645; Residential Outdoor: 1,215; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Paving	Cement and Mortar Mixers	4	6.00	9	0.56
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Grading	Concrete/Industrial Saws	1	8.00	81	0.73
Building Construction	Cranes	1	4.00	226	0.29
Building Construction	Forklifts	2	6.00	89	0.20
Site Preparation	Graders	1	8.00	174	0.41
Paving	Pavers	1	7.00	125	0.42
Paving	Rollers	1	7.00	80	0.38
Demolition	Rubber Tired Dozers	1	1.00	255	0.40
Grading	Rubber Tired Dozers	1	1.00	255	0.40
Building Construction	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Demolition	Tractors/Loaders/Backhoes	2	6.00	97	0.37
Grading	Tractors/Loaders/Backhoes	2	6.00	97	0.37
Paving	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	4	10.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	2	5.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	4	10.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	5	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	7	18.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	6.5600e-003	0.0562	0.0435	6.0000e-005		4.0200e-003	4.0200e-003		3.8400e-003	3.8400e-003	0.0000	5.4141	5.4141	1.0800e-003	0.0000	5.4369
Total	**6.5600e-003**	**0.0562**	**0.0435**	**6.0000e-005**		**4.0200e-003**	**4.0200e-003**		**3.8400e-003**	**3.8400e-003**	**0.0000**	**5.4141**	**5.4141**	**1.0800e-003**	**0.0000**	**5.4369**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.4000e-004	3.6000e-004	3.2200e-003	0.0000	4.0000e-004	0.0000	4.0000e-004	1.1000e-004	0.0000	1.1000e-004	0.0000	0.3732	0.3732	3.0000e-005	0.0000	0.3737
Total	**2.4000e-004**	**3.6000e-004**	**3.2200e-003**	**0.0000**	**4.0000e-004**	**0.0000**	**4.0000e-004**	**1.1000e-004**	**0.0000**	**1.1000e-004**	**0.0000**	**0.3732**	**0.3732**	**3.0000e-005**	**0.0000**	**0.3737**

3.2 Demolition - 2016

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	6.5600e-003	0.0562	0.0435	6.0000e-005		4.0200e-003	4.0200e-003		3.8400e-003	3.8400e-003	0.0000	5.4141	5.4141	1.0800e-003	0.0000	5.4369
Total	**6.5600e-003**	**0.0562**	**0.0435**	**6.0000e-005**		**4.0200e-003**	**4.0200e-003**		**3.8400e-003**	**3.8400e-003**	**0.0000**	**5.4141**	**5.4141**	**1.0800e-003**	**0.0000**	**5.4369**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.4000e-004	3.6000e-004	3.2200e-003	0.0000	4.0000e-004	0.0000	4.0000e-004	1.1000e-004	0.0000	1.1000e-004	0.0000	0.3732	0.3732	3.0000e-005	0.0000	0.3737
Total	**2.4000e-004**	**3.6000e-004**	**3.2200e-003**	**0.0000**	**4.0000e-004**	**0.0000**	**4.0000e-004**	**1.1000e-004**	**0.0000**	**1.1000e-004**	**0.0000**	**0.3732**	**0.3732**	**3.0000e-005**	**0.0000**	**0.3737**

3.3 Site Preparation - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					2.7000e-004	0.0000	2.7000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	6.8000e-004	6.8200e-003	3.6700e-003	0.0000		4.2000e-004	4.2000e-004		3.8000e-004	3.8000e-004	0.0000	0.4414	0.4414	1.3000e-004	0.0000	0.4442
Total	**6.8000e-004**	**6.8200e-003**	**3.6700e-003**	**0.0000**	**2.7000e-004**	**4.2000e-004**	**6.9000e-004**	**3.0000e-005**	**3.8000e-004**	**4.1000e-004**	**0.0000**	**0.4414**	**0.4414**	**1.3000e-004**	**0.0000**	**0.4442**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.0000e-005	2.0000e-005	1.6000e-004	0.0000	2.0000e-005	0.0000	2.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0187	0.0187	0.0000	0.0000	0.0187
Total	**1.0000e-005**	**2.0000e-005**	**1.6000e-004**	**0.0000**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0187**	**0.0187**	**0.0000**	**0.0000**	**0.0187**

3.3 Site Preparation - 2016

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					2.7000e-004	0.0000	2.7000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	6.8000e-004	6.8200e-003	3.6700e-003	0.0000		4.2000e-004	4.2000e-004		3.8000e-004	3.8000e-004	0.0000	0.4414	0.4414	1.3000e-004	0.0000	0.4442
Total	**6.8000e-004**	**6.8200e-003**	**3.6700e-003**	**0.0000**	**2.7000e-004**	**4.2000e-004**	**6.9000e-004**	**3.0000e-005**	**3.8000e-004**	**4.1000e-004**	**0.0000**	**0.4414**	**0.4414**	**1.3000e-004**	**0.0000**	**0.4442**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.0000e-005	2.0000e-005	1.6000e-004	0.0000	2.0000e-005	0.0000	2.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0187	0.0187	0.0000	0.0000	0.0187
Total	**1.0000e-005**	**2.0000e-005**	**1.6000e-004**	**0.0000**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0187**	**0.0187**	**0.0000**	**0.0000**	**0.0187**

3.4 Grading - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					7.5000e-004	0.0000	7.5000e-004	4.1000e-004	0.0000	4.1000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.3100e-003	0.0112	8.7000e-003	1.0000e-005		8.0000e-004	8.0000e-004		7.7000e-004	7.7000e-004	0.0000	1.0828	1.0828	2.2000e-004	0.0000	1.0874
Total	**1.3100e-003**	**0.0112**	**8.7000e-003**	**1.0000e-005**	**7.5000e-004**	**8.0000e-004**	**1.5500e-003**	**4.1000e-004**	**7.7000e-004**	**1.1800e-003**	**0.0000**	**1.0828**	**1.0828**	**2.2000e-004**	**0.0000**	**1.0874**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.0000e-005	7.0000e-005	6.4000e-004	0.0000	8.0000e-005	0.0000	8.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0746	0.0746	1.0000e-005	0.0000	0.0748
Total	**5.0000e-005**	**7.0000e-005**	**6.4000e-004**	**0.0000**	**8.0000e-005**	**0.0000**	**8.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**0.0746**	**0.0746**	**1.0000e-005**	**0.0000**	**0.0748**

3.4 Grading - 2016

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					7.5000e-004	0.0000	7.5000e-004	4.1000e-004	0.0000	4.1000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.3100e-003	0.0112	8.7000e-003	1.0000e-005		8.0000e-004	8.0000e-004		7.7000e-004	7.7000e-004	0.0000	1.0828	1.0828	2.2000e-004	0.0000	1.0874
Total	**1.3100e-003**	**0.0112**	**8.7000e-003**	**1.0000e-005**	**7.5000e-004**	**8.0000e-004**	**1.5500e-003**	**4.1000e-004**	**7.7000e-004**	**1.1800e-003**	**0.0000**	**1.0828**	**1.0828**	**2.2000e-004**	**0.0000**	**1.0874**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.0000e-005	7.0000e-005	6.4000e-004	0.0000	8.0000e-005	0.0000	8.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0746	0.0746	1.0000e-005	0.0000	0.0748
Total	**5.0000e-005**	**7.0000e-005**	**6.4000e-004**	**0.0000**	**8.0000e-005**	**0.0000**	**8.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**0.0746**	**0.0746**	**1.0000e-005**	**0.0000**	**0.0748**

3.5 Building Construction - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0691	0.6853	0.4106	5.7000e-004		0.0470	0.0470		0.0432	0.0432	0.0000	53.4584	53.4584	0.0161	0.0000	53.7970
Total	**0.0691**	**0.6853**	**0.4106**	**5.7000e-004**		**0.0470**	**0.0470**		**0.0432**	**0.0432**	**0.0000**	**53.4584**	**53.4584**	**0.0161**	**0.0000**	**53.7970**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.5 Building Construction - 2016

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0691	0.6853	0.4106	5.7000e-004		0.0470	0.0470		0.0432	0.0432	0.0000	53.4583	53.4583	0.0161	0.0000	53.7969
Total	**0.0691**	**0.6853**	**0.4106**	**5.7000e-004**		**0.0470**	**0.0470**		**0.0432**	**0.0432**	**0.0000**	**53.4583**	**53.4583**	**0.0161**	**0.0000**	**53.7969**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.6 Paving - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	2.8000e-003	0.0266	0.0182	3.0000e-005		1.6500e-003	1.6500e-003		1.5300e-003	1.5300e-003	0.0000	2.4575	2.4575	6.7000e-004	0.0000	2.4717
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**2.8000e-003**	**0.0266**	**0.0182**	**3.0000e-005**		**1.6500e-003**	**1.6500e-003**		**1.5300e-003**	**1.5300e-003**	**0.0000**	**2.4575**	**2.4575**	**6.7000e-004**	**0.0000**	**2.4717**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.1000e-004	3.2000e-004	2.9000e-003	0.0000	3.6000e-004	0.0000	3.6000e-004	1.0000e-004	0.0000	1.0000e-004	0.0000	0.3359	0.3359	2.0000e-005	0.0000	0.3364
Total	**2.1000e-004**	**3.2000e-004**	**2.9000e-003**	**0.0000**	**3.6000e-004**	**0.0000**	**3.6000e-004**	**1.0000e-004**	**0.0000**	**1.0000e-004**	**0.0000**	**0.3359**	**0.3359**	**2.0000e-005**	**0.0000**	**0.3364**

3.6 Paving - 2016

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	2.8000e-003	0.0266	0.0182	3.0000e-005		1.6500e-003	1.6500e-003		1.5300e-003	1.5300e-003	0.0000	2.4575	2.4575	6.7000e-004	0.0000	2.4717
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**2.8000e-003**	**0.0266**	**0.0182**	**3.0000e-005**		**1.6500e-003**	**1.6500e-003**		**1.5300e-003**	**1.5300e-003**	**0.0000**	**2.4575**	**2.4575**	**6.7000e-004**	**0.0000**	**2.4717**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.1000e-004	3.2000e-004	2.9000e-003	0.0000	3.6000e-004	0.0000	3.6000e-004	1.0000e-004	0.0000	1.0000e-004	0.0000	0.3359	0.3359	2.0000e-005	0.0000	0.3364
Total	**2.1000e-004**	**3.2000e-004**	**2.9000e-003**	**0.0000**	**3.6000e-004**	**0.0000**	**3.6000e-004**	**1.0000e-004**	**0.0000**	**1.0000e-004**	**0.0000**	**0.3359**	**0.3359**	**2.0000e-005**	**0.0000**	**0.3364**

3.7 Architectural Coating - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0282					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	9.2000e-004	5.9300e-003	4.7100e-003	1.0000e-005		4.9000e-004	4.9000e-004		4.9000e-004	4.9000e-004	0.0000	0.6383	0.6383	8.0000e-005	0.0000	0.6399
Total	**0.0291**	**5.9300e-003**	**4.7100e-003**	**1.0000e-005**		**4.9000e-004**	**4.9000e-004**		**4.9000e-004**	**4.9000e-004**	**0.0000**	**0.6383**	**0.6383**	**8.0000e-005**	**0.0000**	**0.6399**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.7 Architectural Coating - 2016

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0282					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	9.2000e-004	5.9300e-003	4.7100e-003	1.0000e-005		4.9000e-004	4.9000e-004		4.9000e-004	4.9000e-004	0.0000	0.6383	0.6383	8.0000e-005	0.0000	0.6399
Total	**0.0291**	**5.9300e-003**	**4.7100e-003**	**1.0000e-005**		**4.9000e-004**	**4.9000e-004**		**4.9000e-004**	**4.9000e-004**	**0.0000**	**0.6383**	**0.6383**	**8.0000e-005**	**0.0000**	**0.6399**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	6.7900e-003	0.0181	0.0787	1.6000e-004	0.0103	2.3000e-004	0.0105	2.7500e-003	2.2000e-004	2.9700e-003	0.0000	11.5787	11.5787	5.4000e-004	0.0000	11.5900
Unmitigated	6.7900e-003	0.0181	0.0787	1.6000e-004	0.0103	2.3000e-004	0.0105	2.7500e-003	2.2000e-004	2.9700e-003	0.0000	11.5787	11.5787	5.4000e-004	0.0000	11.5900

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Single Family Housing	9.57	10.08	8.77	27,451	27,451
Total	9.57	10.08	8.77	27,451	27,451

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Single Family Housing	10.80	7.30	7.50	44.00	18.80	37.20	86	11	3

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.463435	0.038745	0.210439	0.164429	0.051257	0.007280	0.016684	0.030757	0.003062	0.002166	0.008230	0.000809	0.002706

4.4 Fleet Mix

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	2.2295	2.2295	1.0000e-004	2.0000e-005	2.2380
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	2.2295	2.2295	1.0000e-004	2.0000e-005	2.2380
NaturalGas Mitigated	1.7000e-004	1.4400e-003	6.1000e-004	1.0000e-005		1.2000e-004	1.2000e-004		1.2000e-004	1.2000e-004	0.0000	1.6723	1.6723	3.0000e-005	3.0000e-005	1.6825
NaturalGas Unmitigated	1.7000e-004	1.4400e-003	6.1000e-004	1.0000e-005		1.2000e-004	1.2000e-004		1.2000e-004	1.2000e-004	0.0000	1.6723	1.6723	3.0000e-005	3.0000e-005	1.6825

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Single Family Housing	31338.5	1.7000e-004	1.4400e-003	6.1000e-004	1.0000e-005		1.2000e-004	1.2000e-004		1.2000e-004	1.2000e-004	0.0000	1.6723	1.6723	3.0000e-005	3.0000e-005	1.6825
Total		**1.7000e-004**	**1.4400e-003**	**6.1000e-004**	**1.0000e-005**		**1.2000e-004**	**1.2000e-004**		**1.2000e-004**	**1.2000e-004**	**0.0000**	**1.6723**	**1.6723**	**3.0000e-005**	**3.0000e-005**	**1.6825**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Single Family Housing	31338.5	1.7000e-004	1.4400e-003	6.1000e-004	1.0000e-005		1.2000e-004	1.2000e-004		1.2000e-004	1.2000e-004	0.0000	1.6723	1.6723	3.0000e-005	3.0000e-005	1.6825
Total		**1.7000e-004**	**1.4400e-003**	**6.1000e-004**	**1.0000e-005**		**1.2000e-004**	**1.2000e-004**		**1.2000e-004**	**1.2000e-004**	**0.0000**	**1.6723**	**1.6723**	**3.0000e-005**	**3.0000e-005**	**1.6825**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Single Family Housing	7663.71	2.2295	1.0000e-004	2.0000e-005	2.2380
Total		**2.2295**	**1.0000e-004**	**2.0000e-005**	**2.2380**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Single Family Housing	7663.71	2.2295	1.0000e-004	2.0000e-005	2.2380
Total		**2.2295**	**1.0000e-004**	**2.0000e-005**	**2.2380**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0728	9.4000e-004	0.0848	3.0000e-005		0.0109	0.0109		0.0109	0.0109	1.0330	0.4453	1.4783	9.7000e-004	8.0000e-005	1.5238
Unmitigated	0.0728	9.4000e-004	0.0848	3.0000e-005		0.0109	0.0109		0.0109	0.0109	1.0330	0.4453	1.4783	9.7000e-004	8.0000e-005	1.5238

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	2.8200e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	7.0300e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0628	8.5000e-004	0.0773	3.0000e-005		0.0109	0.0109		0.0109	0.0109	1.0330	0.4332	1.4662	9.5000e-004	8.0000e-005	1.5114
Landscaping	2.3000e-004	9.0000e-005	7.4600e-003	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005	0.0000	0.0121	0.0121	1.0000e-005	0.0000	0.0124
Total	**0.0728**	**9.4000e-004**	**0.0848**	**3.0000e-005**		**0.0109**	**0.0109**		**0.0109**	**0.0109**	**1.0330**	**0.4453**	**1.4783**	**9.6000e-004**	**8.0000e-005**	**1.5238**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	2.8200e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	7.0300e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0628	8.5000e-004	0.0773	3.0000e-005		0.0109	0.0109		0.0109	0.0109	1.0330	0.4332	1.4662	9.5000e-004	8.0000e-005	1.5114
Landscaping	2.3000e-004	9.0000e-005	7.4600e-003	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005	0.0000	0.0121	0.0121	1.0000e-005	0.0000	0.0124
Total	**0.0728**	**9.4000e-004**	**0.0848**	**3.0000e-005**		**0.0109**	**0.0109**		**0.0109**	**0.0109**	**1.0330**	**0.4453**	**1.4783**	**9.6000e-004**	**8.0000e-005**	**1.5238**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.1651	2.1300e-003	5.0000e-005	0.2257
Unmitigated	0.1651	2.1300e-003	5.0000e-005	0.2257

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Single Family Housing	0.065154 / 0.0410754	0.1651	2.1300e-003	5.0000e-005	0.2257
Total		**0.1651**	**2.1300e-003**	**5.0000e-005**	**0.2257**

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Single Family Housing	0.065154 / 0.0410754	0.1651	2.1300e-003	5.0000e-005	0.2257
Total		**0.1651**	**2.1300e-003**	**5.0000e-005**	**0.2257**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.2680	0.0158	0.0000	0.6005
Unmitigated	0.2680	0.0158	0.0000	0.6005

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Single Family Housing	1.32	0.2680	0.0158	0.0000	0.6005
Total		**0.2680**	**0.0158**	**0.0000**	**0.6005**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Single Family Housing	1.32	0.2680	0.0158	0.0000	0.6005
Total		**0.2680**	**0.0158**	**0.0000**	**0.6005**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

Carmel Rio Existing

North Central Coast Air Basin, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Single Family Housing	1.00	Dwelling Unit	0.32	1,800.00	3

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.8	**Precipitation Freq (Days)**	53
Climate Zone	3			**Operational Year**	2019
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Table Name	Column Name	Default Value	New Value
tblProjectCharacteristics	OperationalYear	2014	2019

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2016	11.6315	13.7058	9.3611	0.0131	0.8349	0.9398	1.6396	0.4356	0.8646	1.2037	0.0000	1,280.6109	1,280.6109	0.3555	0.0000	1,288.0763
Total	**11.6315**	**13.7058**	**9.3611**	**0.0131**	**0.8349**	**0.9398**	**1.6396**	**0.4356**	**0.8646**	**1.2037**	**0.0000**	**1,280.6109**	**1,280.6109**	**0.3555**	**0.0000**	**1,288.0763**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2016	11.6315	13.7058	9.3611	0.0131	0.8349	0.9398	1.6396	0.4356	0.8646	1.2037	0.0000	1,280.6109	1,280.6109	0.3555	0.0000	1,288.0763
Total	**11.6315**	**13.7058**	**9.3611**	**0.0131**	**0.8349**	**0.9398**	**1.6396**	**0.4356**	**0.8646**	**1.2037**	**0.0000**	**1,280.6109**	**1,280.6109**	**0.3555**	**0.0000**	**1,288.0763**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.5869	0.0217	1.9682	7.4000e-004		0.2653	0.2653		0.2653	0.2653	27.7717	11.7956	39.5673	0.0258	2.1800e-003	40.7858
Energy	9.3000e-004	7.9100e-003	3.3700e-003	5.0000e-005		6.4000e-004	6.4000e-004		6.4000e-004	6.4000e-004		10.1011	10.1011	1.9000e-004	1.9000e-004	10.1625
Mobile	0.0391	0.0978	0.4325	9.6000e-004	0.0616	1.3600e-003	0.0630	0.0165	1.2500e-003	0.0177		77.3591	77.3591	3.4400e-003		77.4313
Total	**1.6269**	**0.1274**	**2.4040**	**1.7500e-003**	**0.0616**	**0.2673**	**0.3289**	**0.0165**	**0.2672**	**0.2837**	**27.7717**	**99.2557**	**127.0275**	**0.0294**	**2.3700e-003**	**128.3796**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.5869	0.0217	1.9682	7.4000e-004		0.2653	0.2653		0.2653	0.2653	27.7717	11.7956	39.5673	0.0258	2.1800e-003	40.7858
Energy	9.3000e-004	7.9100e-003	3.3700e-003	5.0000e-005		6.4000e-004	6.4000e-004		6.4000e-004	6.4000e-004		10.1011	10.1011	1.9000e-004	1.9000e-004	10.1625
Mobile	0.0391	0.0978	0.4325	9.6000e-004	0.0616	1.3600e-003	0.0630	0.0165	1.2500e-003	0.0177		77.3591	77.3591	3.4400e-003		77.4313
Total	**1.6269**	**0.1274**	**2.4040**	**1.7500e-003**	**0.0616**	**0.2673**	**0.3289**	**0.0165**	**0.2672**	**0.2837**	**27.7717**	**99.2557**	**127.0275**	**0.0294**	**2.3700e-003**	**128.3796**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2016	1/14/2016	5	10	
2	Site Preparation	Site Preparation	1/15/2016	1/15/2016	5	1	
3	Grading	Grading	1/16/2016	1/19/2016	5	2	
4	Building Construction	Building Construction	1/20/2016	6/7/2016	5	100	
5	Paving	Paving	6/8/2016	6/14/2016	5	5	
6	Architectural Coating	Architectural Coating	6/15/2016	6/21/2016	5	5	

Acres of Grading (Site Preparation Phase): 0.5

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 3,645; Residential Outdoor: 1,215; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Paving	Cement and Mortar Mixers	4	6.00	9	0.56
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Grading	Concrete/Industrial Saws	1	8.00	81	0.73
Building Construction	Cranes	1	4.00	226	0.29
Building Construction	Forklifts	2	6.00	89	0.20
Site Preparation	Graders	1	8.00	174	0.41
Paving	Pavers	1	7.00	125	0.42
Paving	Rollers	1	7.00	80	0.38
Demolition	Rubber Tired Dozers	1	1.00	255	0.40
Grading	Rubber Tired Dozers	1	1.00	255	0.40
Building Construction	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Demolition	Tractors/Loaders/Backhoes	2	6.00	97	0.37
Grading	Tractors/Loaders/Backhoes	2	6.00	97	0.37
Paving	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	4	10.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	2	5.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	4	10.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	5	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	7	18.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.3122	11.2385	8.7048	0.0120		0.8039	0.8039		0.7674	0.7674		1,193.6106	1,193.6106	0.2386		1,198.6217
Total	**1.3122**	**11.2385**	**8.7048**	**0.0120**		**0.8039**	**0.8039**		**0.7674**	**0.7674**		**1,193.6106**	**1,193.6106**	**0.2386**		**1,198.6217**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0475	0.0626	0.6563	1.0400e-003	0.0822	8.2000e-004	0.0830	0.0218	7.5000e-004	0.0225		87.0003	87.0003	5.8300e-003		87.1228
Total	**0.0475**	**0.0626**	**0.6563**	**1.0400e-003**	**0.0822**	**8.2000e-004**	**0.0830**	**0.0218**	**7.5000e-004**	**0.0225**		**87.0003**	**87.0003**	**5.8300e-003**		**87.1228**

3.2 Demolition - 2016

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.3122	11.2385	8.7048	0.0120		0.8039	0.8039		0.7674	0.7674	0.0000	1,193.6106	1,193.6106	0.2386		1,198.6217
Total	**1.3122**	**11.2385**	**8.7048**	**0.0120**		**0.8039**	**0.8039**		**0.7674**	**0.7674**	**0.0000**	**1,193.6106**	**1,193.6106**	**0.2386**		**1,198.6217**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0475	0.0626	0.6563	1.0400e-003	0.0822	8.2000e-004	0.0830	0.0218	7.5000e-004	0.0225		87.0003	87.0003	5.8300e-003		87.1228
Total	**0.0475**	**0.0626**	**0.6563**	**1.0400e-003**	**0.0822**	**8.2000e-004**	**0.0830**	**0.0218**	**7.5000e-004**	**0.0225**		**87.0003**	**87.0003**	**5.8300e-003**		**87.1228**

3.3 Site Preparation - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.5303	0.0000	0.5303	0.0573	0.0000	0.0573			0.0000			0.0000
Off-Road	1.3593	13.6350	7.3401	9.3500e-003		0.8338	0.8338		0.7671	0.7671		973.0842	973.0842	0.2935		979.2481
Total	**1.3593**	**13.6350**	**7.3401**	**9.3500e-003**	**0.5303**	**0.8338**	**1.3640**	**0.0573**	**0.7671**	**0.8243**		**973.0842**	**973.0842**	**0.2935**		**979.2481**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0237	0.0313	0.3282	5.2000e-004	0.0411	4.1000e-004	0.0415	0.0109	3.8000e-004	0.0113		43.5001	43.5001	2.9200e-003		43.5614
Total	**0.0237**	**0.0313**	**0.3282**	**5.2000e-004**	**0.0411**	**4.1000e-004**	**0.0415**	**0.0109**	**3.8000e-004**	**0.0113**		**43.5001**	**43.5001**	**2.9200e-003**		**43.5614**

3.3 Site Preparation - 2016

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.5303	0.0000	0.5303	0.0573	0.0000	0.0573			0.0000			0.0000
Off-Road	1.3593	13.6350	7.3401	9.3500e-003		0.8338	0.8338		0.7671	0.7671	0.0000	973.0842	973.0842	0.2935		979.2481
Total	**1.3593**	**13.6350**	**7.3401**	**9.3500e-003**	**0.5303**	**0.8338**	**1.3640**	**0.0573**	**0.7671**	**0.8243**	**0.0000**	**973.0842**	**973.0842**	**0.2935**		**979.2481**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0237	0.0313	0.3282	5.2000e-004	0.0411	4.1000e-004	0.0415	0.0109	3.8000e-004	0.0113		43.5001	43.5001	2.9200e-003		43.5614
Total	**0.0237**	**0.0313**	**0.3282**	**5.2000e-004**	**0.0411**	**4.1000e-004**	**0.0415**	**0.0109**	**3.8000e-004**	**0.0113**		**43.5001**	**43.5001**	**2.9200e-003**		**43.5614**

3.4 Grading - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.7528	0.0000	0.7528	0.4138	0.0000	0.4138			0.0000			0.0000
Off-Road	1.3122	11.2385	8.7048	0.0120		0.8039	0.8039		0.7674	0.7674		1,193.6106	1,193.6106	0.2386		1,198.6217
Total	**1.3122**	**11.2385**	**8.7048**	**0.0120**	**0.7528**	**0.8039**	**1.5566**	**0.4138**	**0.7674**	**1.1811**		**1,193.6106**	**1,193.6106**	**0.2386**		**1,198.6217**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0475	0.0626	0.6563	1.0400e-003	0.0822	8.2000e-004	0.0830	0.0218	7.5000e-004	0.0225		87.0003	87.0003	5.8300e-003		87.1228
Total	**0.0475**	**0.0626**	**0.6563**	**1.0400e-003**	**0.0822**	**8.2000e-004**	**0.0830**	**0.0218**	**7.5000e-004**	**0.0225**		**87.0003**	**87.0003**	**5.8300e-003**		**87.1228**

3.4 Grading - 2016

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.7528	0.0000	0.7528	0.4138	0.0000	0.4138			0.0000			0.0000
Off-Road	1.3122	11.2385	8.7048	0.0120		0.8039	0.8039		0.7674	0.7674	0.0000	1,193.6106	1,193.6106	0.2386		1,198.6217
Total	**1.3122**	**11.2385**	**8.7048**	**0.0120**	**0.7528**	**0.8039**	**1.5566**	**0.4138**	**0.7674**	**1.1811**	**0.0000**	**1,193.6106**	**1,193.6106**	**0.2386**		**1,198.6217**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0475	0.0626	0.6563	1.0400e-003	0.0822	8.2000e-004	0.0830	0.0218	7.5000e-004	0.0225		87.0003	87.0003	5.8300e-003		87.1228
Total	**0.0475**	**0.0626**	**0.6563**	**1.0400e-003**	**0.0822**	**8.2000e-004**	**0.0830**	**0.0218**	**7.5000e-004**	**0.0225**		**87.0003**	**87.0003**	**5.8300e-003**		**87.1228**

3.5 Building Construction - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.3816	13.7058	8.2122	0.0113		0.9398	0.9398		0.8646	0.8646		1,178.5549	1,178.5549	0.3555		1,186.0202
Total	**1.3816**	**13.7058**	**8.2122**	**0.0113**		**0.9398**	**0.9398**		**0.8646**	**0.8646**		**1,178.5549**	**1,178.5549**	**0.3555**		**1,186.0202**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.5 Building Construction - 2016

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.3816	13.7058	8.2122	0.0113		0.9398	0.9398		0.8646	0.8646	0.0000	1,178.5549	1,178.5549	0.3555		1,186.0202
Total	**1.3816**	**13.7058**	**8.2122**	**0.0113**		**0.9398**	**0.9398**		**0.8646**	**0.8646**	**0.0000**	**1,178.5549**	**1,178.5549**	**0.3555**		**1,186.0202**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.6 Paving - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1203	10.6282	7.2935	0.0111		0.6606	0.6606		0.6113	0.6113		1,083.5832	1,083.5832	0.2969		1,089.8175
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.1203**	**10.6282**	**7.2935**	**0.0111**		**0.6606**	**0.6606**		**0.6113**	**0.6113**		**1,083.5832**	**1,083.5832**	**0.2969**		**1,089.8175**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0854	0.1126	1.1814	1.8800e-003	0.1479	1.4800e-003	0.1494	0.0392	1.3500e-003	0.0406		156.6005	156.6005	0.0105		156.8211
Total	**0.0854**	**0.1126**	**1.1814**	**1.8800e-003**	**0.1479**	**1.4800e-003**	**0.1494**	**0.0392**	**1.3500e-003**	**0.0406**		**156.6005**	**156.6005**	**0.0105**		**156.8211**

3.6 Paving - 2016

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1203	10.6282	7.2935	0.0111		0.6606	0.6606		0.6113	0.6113	0.0000	1,083.5832	1,083.5832	0.2969		1,089.8175
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.1203**	**10.6282**	**7.2935**	**0.0111**		**0.6606**	**0.6606**		**0.6113**	**0.6113**	**0.0000**	**1,083.5832**	**1,083.5832**	**0.2969**		**1,089.8175**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0854	0.1126	1.1814	1.8800e-003	0.1479	1.4800e-003	0.1494	0.0392	1.3500e-003	0.0406		156.6005	156.6005	0.0105		156.8211
Total	**0.0854**	**0.1126**	**1.1814**	**1.8800e-003**	**0.1479**	**1.4800e-003**	**0.1494**	**0.0392**	**1.3500e-003**	**0.0406**		**156.6005**	**156.6005**	**0.0105**		**156.8211**

3.7 Architectural Coating - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	11.2631					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3685	2.3722	1.8839	2.9700e-003		0.1966	0.1966		0.1966	0.1966		281.4481	281.4481	0.0332		282.1449
Total	**11.6315**	**2.3722**	**1.8839**	**2.9700e-003**		**0.1966**	**0.1966**		**0.1966**	**0.1966**		**281.4481**	**281.4481**	**0.0332**		**282.1449**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.7 Architectural Coating - 2016

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	11.2631					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3685	2.3722	1.8839	2.9700e-003		0.1966	0.1966		0.1966	0.1966	0.0000	281.4481	281.4481	0.0332		282.1449
Total	**11.6315**	**2.3722**	**1.8839**	**2.9700e-003**		**0.1966**	**0.1966**		**0.1966**	**0.1966**	**0.0000**	**281.4481**	**281.4481**	**0.0332**		**282.1449**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0391	0.0978	0.4325	9.6000e-004	0.0616	1.3600e-003	0.0630	0.0165	1.2500e-003	0.0177		77.3591	77.3591	3.4400e-003		77.4313
Unmitigated	0.0391	0.0978	0.4325	9.6000e-004	0.0616	1.3600e-003	0.0630	0.0165	1.2500e-003	0.0177		77.3591	77.3591	3.4400e-003		77.4313

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Single Family Housing	9.57	10.08	8.77	27,451	27,451
Total	9.57	10.08	8.77	27,451	27,451

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Single Family Housing	10.80	7.30	7.50	44.00	18.80	37.20	86	11	3

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.463435	0.038745	0.210439	0.164429	0.051257	0.007280	0.016684	0.030757	0.003062	0.002166	0.008230	0.000809	0.002706

4.4 Fleet Mix

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	9.3000e-004	7.9100e-003	3.3700e-003	5.0000e-005		6.4000e-004	6.4000e-004		6.4000e-004	6.4000e-004		10.1011	10.1011	1.9000e-004	1.9000e-004	10.1625
NaturalGas Unmitigated	9.3000e-004	7.9100e-003	3.3700e-003	5.0000e-005		6.4000e-004	6.4000e-004		6.4000e-004	6.4000e-004		10.1011	10.1011	1.9000e-004	1.9000e-004	10.1625

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	85.859	9.3000e-004	7.9100e-003	3.3700e-003	5.0000e-005		6.4000e-004	6.4000e-004		6.4000e-004	6.4000e-004		10.1011	10.1011	1.9000e-004	1.9000e-004	10.1625
Total		**9.3000e-004**	**7.9100e-003**	**3.3700e-003**	**5.0000e-005**		**6.4000e-004**	**6.4000e-004**		**6.4000e-004**	**6.4000e-004**		**10.1011**	**10.1011**	**1.9000e-004**	**1.9000e-004**	**10.1625**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	0.085859	9.3000e-004	7.9100e-003	3.3700e-003	5.0000e-005		6.4000e-004	6.4000e-004		6.4000e-004	6.4000e-004		10.1011	10.1011	1.9000e-004	1.9000e-004	10.1625
Total		**9.3000e-004**	**7.9100e-003**	**3.3700e-003**	**5.0000e-005**		**6.4000e-004**	**6.4000e-004**		**6.4000e-004**	**6.4000e-004**		**10.1011**	**10.1011**	**1.9000e-004**	**1.9000e-004**	**10.1625**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	1.5869	0.0217	1.9682	7.4000e-004		0.2653	0.2653		0.2653	0.2653	27.7717	11.7956	39.5673	0.0258	2.1800e-003	40.7858
Unmitigated	1.5869	0.0217	1.9682	7.4000e-004		0.2653	0.2653		0.2653	0.2653	27.7717	11.7956	39.5673	0.0258	2.1800e-003	40.7858

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0154					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0385					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	1.5304	0.0208	1.8853	7.4000e-004		0.2649	0.2649		0.2649	0.2649	27.7717	11.6471	39.4188	0.0256	2.1800e-003	40.6342
Landscaping	2.5400e-003	9.6000e-004	0.0829	0.0000		4.5000e-004	4.5000e-004		4.5000e-004	4.5000e-004		0.1486	0.1486	1.5000e-004		0.1516
Total	**1.5869**	**0.0217**	**1.9682**	**7.4000e-004**		**0.2653**	**0.2653**		**0.2653**	**0.2653**	**27.7717**	**11.7956**	**39.5673**	**0.0258**	**2.1800e-003**	**40.7858**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0154					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0385					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	1.5304	0.0208	1.8853	7.4000e-004		0.2649	0.2649		0.2649	0.2649	27.7717	11.6471	39.4188	0.0256	2.1800e-003	40.6342
Landscaping	2.5400e-003	9.6000e-004	0.0829	0.0000		4.5000e-004	4.5000e-004		4.5000e-004	4.5000e-004		0.1486	0.1486	1.5000e-004		0.1516
Total	**1.5869**	**0.0217**	**1.9682**	**7.4000e-004**		**0.2653**	**0.2653**		**0.2653**	**0.2653**	**27.7717**	**11.7956**	**39.5673**	**0.0258**	**2.1800e-003**	**40.7858**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

Carmel Rio Existing

North Central Coast Air Basin, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Single Family Housing	1.00	Dwelling Unit	0.32	1,800.00	3

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.8	**Precipitation Freq (Days)**	53
Climate Zone	3			**Operational Year**	2019
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Table Name	Column Name	Default Value	New Value
tblProjectCharacteristics	OperationalYear	2014	2019

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2016	11.6315	13.7058	9.3895	0.0130	0.8349	0.9398	1.6396	0.4356	0.8646	1.2037	0.0000	1,275.5319	1,275.5319	0.3555	0.0000	1,282.9973
Total	**11.6315**	**13.7058**	**9.3895**	**0.0130**	**0.8349**	**0.9398**	**1.6396**	**0.4356**	**0.8646**	**1.2037**	**0.0000**	**1,275.5319**	**1,275.5319**	**0.3555**	**0.0000**	**1,282.9973**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2016	11.6315	13.7058	9.3895	0.0130	0.8349	0.9398	1.6396	0.4356	0.8646	1.2037	0.0000	1,275.5319	1,275.5319	0.3555	0.0000	1,282.9973
Total	**11.6315**	**13.7058**	**9.3895**	**0.0130**	**0.8349**	**0.9398**	**1.6396**	**0.4356**	**0.8646**	**1.2037**	**0.0000**	**1,275.5319**	**1,275.5319**	**0.3555**	**0.0000**	**1,282.9973**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.5869	0.0217	1.9682	7.4000e-004		0.2653	0.2653		0.2653	0.2653	27.7717	11.7956	39.5673	0.0258	2.1800e-003	40.7858
Energy	9.3000e-004	7.9100e-003	3.3700e-003	5.0000e-005		6.4000e-004	6.4000e-004		6.4000e-004	6.4000e-004		10.1011	10.1011	1.9000e-004	1.9000e-004	10.1625
Mobile	0.0424	0.1103	0.5089	9.2000e-004	0.0616	1.3700e-003	0.0630	0.0165	1.2600e-003	0.0177		73.9949	73.9949	3.4400e-003		74.0672
Total	**1.6302**	**0.1400**	**2.4805**	**1.7100e-003**	**0.0616**	**0.2673**	**0.3290**	**0.0165**	**0.2672**	**0.2837**	**27.7717**	**95.8915**	**123.6633**	**0.0294**	**2.3700e-003**	**125.0155**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.5869	0.0217	1.9682	7.4000e-004		0.2653	0.2653		0.2653	0.2653	27.7717	11.7956	39.5673	0.0258	2.1800e-003	40.7858
Energy	9.3000e-004	7.9100e-003	3.3700e-003	5.0000e-005		6.4000e-004	6.4000e-004		6.4000e-004	6.4000e-004		10.1011	10.1011	1.9000e-004	1.9000e-004	10.1625
Mobile	0.0424	0.1103	0.5089	9.2000e-004	0.0616	1.3700e-003	0.0630	0.0165	1.2600e-003	0.0177		73.9949	73.9949	3.4400e-003		74.0672
Total	**1.6302**	**0.1400**	**2.4805**	**1.7100e-003**	**0.0616**	**0.2673**	**0.3290**	**0.0165**	**0.2672**	**0.2837**	**27.7717**	**95.8915**	**123.6633**	**0.0294**	**2.3700e-003**	**125.0155**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2016	1/14/2016	5	10	
2	Site Preparation	Site Preparation	1/15/2016	1/15/2016	5	1	
3	Grading	Grading	1/16/2016	1/19/2016	5	2	
4	Building Construction	Building Construction	1/20/2016	6/7/2016	5	100	
5	Paving	Paving	6/8/2016	6/14/2016	5	5	
6	Architectural Coating	Architectural Coating	6/15/2016	6/21/2016	5	5	

Acres of Grading (Site Preparation Phase): 0.5

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 3,645; Residential Outdoor: 1,215; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Paving	Cement and Mortar Mixers	4	6.00	9	0.56
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Grading	Concrete/Industrial Saws	1	8.00	81	0.73
Building Construction	Cranes	1	4.00	226	0.29
Building Construction	Forklifts	2	6.00	89	0.20
Site Preparation	Graders	1	8.00	174	0.41
Paving	Pavers	1	7.00	125	0.42
Paving	Rollers	1	7.00	80	0.38
Demolition	Rubber Tired Dozers	1	1.00	255	0.40
Grading	Rubber Tired Dozers	1	1.00	255	0.40
Building Construction	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Demolition	Tractors/Loaders/Backhoes	2	6.00	97	0.37
Grading	Tractors/Loaders/Backhoes	2	6.00	97	0.37
Paving	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	4	10.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	2	5.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	4	10.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	5	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	7	18.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.3122	11.2385	8.7048	0.0120		0.8039	0.8039		0.7674	0.7674		1,193.6106	1,193.6106	0.2386		1,198.6217
Total	**1.3122**	**11.2385**	**8.7048**	**0.0120**		**0.8039**	**0.8039**		**0.7674**	**0.7674**		**1,193.6106**	**1,193.6106**	**0.2386**		**1,198.6217**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0506	0.0785	0.6848	9.8000e-004	0.0822	8.2000e-004	0.0830	0.0218	7.5000e-004	0.0225		81.9213	81.9213	5.8300e-003		82.0438
Total	**0.0506**	**0.0785**	**0.6848**	**9.8000e-004**	**0.0822**	**8.2000e-004**	**0.0830**	**0.0218**	**7.5000e-004**	**0.0225**		**81.9213**	**81.9213**	**5.8300e-003**		**82.0438**

3.2 Demolition - 2016

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.3122	11.2385	8.7048	0.0120		0.8039	0.8039		0.7674	0.7674	0.0000	1,193.6106	1,193.6106	0.2386		1,198.6217
Total	**1.3122**	**11.2385**	**8.7048**	**0.0120**		**0.8039**	**0.8039**		**0.7674**	**0.7674**	**0.0000**	**1,193.6106**	**1,193.6106**	**0.2386**		**1,198.6217**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0506	0.0785	0.6848	9.8000e-004	0.0822	8.2000e-004	0.0830	0.0218	7.5000e-004	0.0225		81.9213	81.9213	5.8300e-003		82.0438
Total	**0.0506**	**0.0785**	**0.6848**	**9.8000e-004**	**0.0822**	**8.2000e-004**	**0.0830**	**0.0218**	**7.5000e-004**	**0.0225**		**81.9213**	**81.9213**	**5.8300e-003**		**82.0438**

3.3 Site Preparation - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.5303	0.0000	0.5303	0.0573	0.0000	0.0573			0.0000			0.0000
Off-Road	1.3593	13.6350	7.3401	9.3500e-003		0.8338	0.8338		0.7671	0.7671		973.0842	973.0842	0.2935		979.2481
Total	**1.3593**	**13.6350**	**7.3401**	**9.3500e-003**	**0.5303**	**0.8338**	**1.3640**	**0.0573**	**0.7671**	**0.8243**		**973.0842**	**973.0842**	**0.2935**		**979.2481**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0253	0.0392	0.3424	4.9000e-004	0.0411	4.1000e-004	0.0415	0.0109	3.8000e-004	0.0113		40.9607	40.9607	2.9200e-003		41.0219
Total	**0.0253**	**0.0392**	**0.3424**	**4.9000e-004**	**0.0411**	**4.1000e-004**	**0.0415**	**0.0109**	**3.8000e-004**	**0.0113**		**40.9607**	**40.9607**	**2.9200e-003**		**41.0219**

3.3 Site Preparation - 2016

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.5303	0.0000	0.5303	0.0573	0.0000	0.0573			0.0000			0.0000
Off-Road	1.3593	13.6350	7.3401	9.3500e-003		0.8338	0.8338		0.7671	0.7671	0.0000	973.0842	973.0842	0.2935		979.2481
Total	**1.3593**	**13.6350**	**7.3401**	**9.3500e-003**	**0.5303**	**0.8338**	**1.3640**	**0.0573**	**0.7671**	**0.8243**	**0.0000**	**973.0842**	**973.0842**	**0.2935**		**979.2481**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0253	0.0392	0.3424	4.9000e-004	0.0411	4.1000e-004	0.0415	0.0109	3.8000e-004	0.0113		40.9607	40.9607	2.9200e-003		41.0219
Total	**0.0253**	**0.0392**	**0.3424**	**4.9000e-004**	**0.0411**	**4.1000e-004**	**0.0415**	**0.0109**	**3.8000e-004**	**0.0113**		**40.9607**	**40.9607**	**2.9200e-003**		**41.0219**

3.4 Grading - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.7528	0.0000	0.7528	0.4138	0.0000	0.4138			0.0000			0.0000
Off-Road	1.3122	11.2385	8.7048	0.0120		0.8039	0.8039		0.7674	0.7674		1,193.6106	1,193.6106	0.2386		1,198.6217
Total	**1.3122**	**11.2385**	**8.7048**	**0.0120**	**0.7528**	**0.8039**	**1.5566**	**0.4138**	**0.7674**	**1.1811**		**1,193.6106**	**1,193.6106**	**0.2386**		**1,198.6217**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0506	0.0785	0.6848	9.8000e-004	0.0822	8.2000e-004	0.0830	0.0218	7.5000e-004	0.0225		81.9213	81.9213	5.8300e-003		82.0438
Total	**0.0506**	**0.0785**	**0.6848**	**9.8000e-004**	**0.0822**	**8.2000e-004**	**0.0830**	**0.0218**	**7.5000e-004**	**0.0225**		**81.9213**	**81.9213**	**5.8300e-003**		**82.0438**

3.4 Grading - 2016

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.7528	0.0000	0.7528	0.4138	0.0000	0.4138			0.0000			0.0000
Off-Road	1.3122	11.2385	8.7048	0.0120		0.8039	0.8039		0.7674	0.7674	0.0000	1,193.6106	1,193.6106	0.2386		1,198.6217
Total	**1.3122**	**11.2385**	**8.7048**	**0.0120**	**0.7528**	**0.8039**	**1.5566**	**0.4138**	**0.7674**	**1.1811**	**0.0000**	**1,193.6106**	**1,193.6106**	**0.2386**		**1,198.6217**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0506	0.0785	0.6848	9.8000e-004	0.0822	8.2000e-004	0.0830	0.0218	7.5000e-004	0.0225		81.9213	81.9213	5.8300e-003		82.0438
Total	**0.0506**	**0.0785**	**0.6848**	**9.8000e-004**	**0.0822**	**8.2000e-004**	**0.0830**	**0.0218**	**7.5000e-004**	**0.0225**		**81.9213**	**81.9213**	**5.8300e-003**		**82.0438**

3.5 Building Construction - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.3816	13.7058	8.2122	0.0113		0.9398	0.9398		0.8646	0.8646		1,178.5549	1,178.5549	0.3555		1,186.0202
Total	**1.3816**	**13.7058**	**8.2122**	**0.0113**		**0.9398**	**0.9398**		**0.8646**	**0.8646**		**1,178.5549**	**1,178.5549**	**0.3555**		**1,186.0202**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.5 Building Construction - 2016

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.3816	13.7058	8.2122	0.0113		0.9398	0.9398		0.8646	0.8646	0.0000	1,178.5549	1,178.5549	0.3555		1,186.0202
Total	**1.3816**	**13.7058**	**8.2122**	**0.0113**		**0.9398**	**0.9398**		**0.8646**	**0.8646**	**0.0000**	**1,178.5549**	**1,178.5549**	**0.3555**		**1,186.0202**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.6 Paving - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1203	10.6282	7.2935	0.0111		0.6606	0.6606		0.6113	0.6113		1,083.5832	1,083.5832	0.2969		1,089.8175
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.1203**	**10.6282**	**7.2935**	**0.0111**		**0.6606**	**0.6606**		**0.6113**	**0.6113**		**1,083.5832**	**1,083.5832**	**0.2969**		**1,089.8175**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0911	0.1412	1.2326	1.7700e-003	0.1479	1.4800e-003	0.1494	0.0392	1.3500e-003	0.0406		147.4584	147.4584	0.0105		147.6789
Total	**0.0911**	**0.1412**	**1.2326**	**1.7700e-003**	**0.1479**	**1.4800e-003**	**0.1494**	**0.0392**	**1.3500e-003**	**0.0406**		**147.4584**	**147.4584**	**0.0105**		**147.6789**

3.6 Paving - 2016

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1203	10.6282	7.2935	0.0111		0.6606	0.6606		0.6113	0.6113	0.0000	1,083.5832	1,083.5832	0.2969		1,089.8175
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.1203**	**10.6282**	**7.2935**	**0.0111**		**0.6606**	**0.6606**		**0.6113**	**0.6113**	**0.0000**	**1,083.5832**	**1,083.5832**	**0.2969**		**1,089.8175**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0911	0.1412	1.2326	1.7700e-003	0.1479	1.4800e-003	0.1494	0.0392	1.3500e-003	0.0406		147.4584	147.4584	0.0105		147.6789
Total	**0.0911**	**0.1412**	**1.2326**	**1.7700e-003**	**0.1479**	**1.4800e-003**	**0.1494**	**0.0392**	**1.3500e-003**	**0.0406**		**147.4584**	**147.4584**	**0.0105**		**147.6789**

3.7 Architectural Coating - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	11.2631					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3685	2.3722	1.8839	2.9700e-003		0.1966	0.1966		0.1966	0.1966		281.4481	281.4481	0.0332		282.1449
Total	**11.6315**	**2.3722**	**1.8839**	**2.9700e-003**		**0.1966**	**0.1966**		**0.1966**	**0.1966**		**281.4481**	**281.4481**	**0.0332**		**282.1449**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.7 Architectural Coating - 2016

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	11.2631					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3685	2.3722	1.8839	2.9700e-003		0.1966	0.1966		0.1966	0.1966	0.0000	281.4481	281.4481	0.0332		282.1449
Total	**11.6315**	**2.3722**	**1.8839**	**2.9700e-003**		**0.1966**	**0.1966**		**0.1966**	**0.1966**	**0.0000**	**281.4481**	**281.4481**	**0.0332**		**282.1449**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0424	0.1103	0.5089	9.2000e-004	0.0616	1.3700e-003	0.0630	0.0165	1.2600e-003	0.0177		73.9949	73.9949	3.4400e-003		74.0672
Unmitigated	0.0424	0.1103	0.5089	9.2000e-004	0.0616	1.3700e-003	0.0630	0.0165	1.2600e-003	0.0177		73.9949	73.9949	3.4400e-003		74.0672

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Single Family Housing	9.57	10.08	8.77	27,451	27,451
Total	9.57	10.08	8.77	27,451	27,451

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Single Family Housing	10.80	7.30	7.50	44.00	18.80	37.20	86	11	3

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.463435	0.038745	0.210439	0.164429	0.051257	0.007280	0.016684	0.030757	0.003062	0.002166	0.008230	0.000809	0.002706

4.4 Fleet Mix

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	9.3000e-004	7.9100e-003	3.3700e-003	5.0000e-005		6.4000e-004	6.4000e-004		6.4000e-004	6.4000e-004		10.1011	10.1011	1.9000e-004	1.9000e-004	10.1625
NaturalGas Unmitigated	9.3000e-004	7.9100e-003	3.3700e-003	5.0000e-005		6.4000e-004	6.4000e-004		6.4000e-004	6.4000e-004		10.1011	10.1011	1.9000e-004	1.9000e-004	10.1625

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	85.859	9.3000e-004	7.9100e-003	3.3700e-003	5.0000e-005		6.4000e-004	6.4000e-004		6.4000e-004	6.4000e-004		10.1011	10.1011	1.9000e-004	1.9000e-004	10.1625
Total		**9.3000e-004**	**7.9100e-003**	**3.3700e-003**	**5.0000e-005**		**6.4000e-004**	**6.4000e-004**		**6.4000e-004**	**6.4000e-004**		**10.1011**	**10.1011**	**1.9000e-004**	**1.9000e-004**	**10.1625**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	0.085859	9.3000e-004	7.9100e-003	3.3700e-003	5.0000e-005		6.4000e-004	6.4000e-004		6.4000e-004	6.4000e-004		10.1011	10.1011	1.9000e-004	1.9000e-004	10.1625
Total		**9.3000e-004**	**7.9100e-003**	**3.3700e-003**	**5.0000e-005**		**6.4000e-004**	**6.4000e-004**		**6.4000e-004**	**6.4000e-004**		**10.1011**	**10.1011**	**1.9000e-004**	**1.9000e-004**	**10.1625**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	1.5869	0.0217	1.9682	7.4000e-004		0.2653	0.2653		0.2653	0.2653	27.7717	11.7956	39.5673	0.0258	2.1800e-003	40.7858
Unmitigated	1.5869	0.0217	1.9682	7.4000e-004		0.2653	0.2653		0.2653	0.2653	27.7717	11.7956	39.5673	0.0258	2.1800e-003	40.7858

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0154					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0385					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	1.5304	0.0208	1.8853	7.4000e-004		0.2649	0.2649		0.2649	0.2649	27.7717	11.6471	39.4188	0.0256	2.1800e-003	40.6342
Landscaping	2.5400e-003	9.6000e-004	0.0829	0.0000		4.5000e-004	4.5000e-004		4.5000e-004	4.5000e-004		0.1486	0.1486	1.5000e-004		0.1516
Total	**1.5869**	**0.0217**	**1.9682**	**7.4000e-004**		**0.2653**	**0.2653**		**0.2653**	**0.2653**	**27.7717**	**11.7956**	**39.5673**	**0.0258**	**2.1800e-003**	**40.7858**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0154					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0385					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	1.5304	0.0208	1.8853	7.4000e-004		0.2649	0.2649		0.2649	0.2649	27.7717	11.6471	39.4188	0.0256	2.1800e-003	40.6342
Landscaping	2.5400e-003	9.6000e-004	0.0829	0.0000		4.5000e-004	4.5000e-004		4.5000e-004	4.5000e-004		0.1486	0.1486	1.5000e-004		0.1516
Total	**1.5869**	**0.0217**	**1.9682**	**7.4000e-004**		**0.2653**	**0.2653**		**0.2653**	**0.2653**	**27.7717**	**11.7956**	**39.5673**	**0.0258**	**2.1800e-003**	**40.7858**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

Carmel Rio Road

North Central Coast Air Basin, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Single Family Housing	7.00	Dwelling Unit	0.91	6,020.00	21
Single Family Housing	24.00	Dwelling Unit	6.99	4,080.00	73

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.8	**Precipitation Freq (Days)**	53
Climate Zone	4			**Operational Year**	2018
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - From project description

Construction Phase - Reflects 18-month construction schedule

Grading - From project plans

Vehicle Trips - From project traffic study

Table Name	Column Name	Default Value	New Value
tblAreaMitigation	UseLowVOCPaintNonresidentialExteriorValue	250	0
tblAreaMitigation	UseLowVOCPaintNonresidentialInteriorValue	250	0
tblAreaMitigation	UseLowVOCPaintResidentialExteriorValue	250	0
tblAreaMitigation	UseLowVOCPaintResidentialInteriorValue	250	0
tblConstructionPhase	NumDays	20.00	28.00
tblConstructionPhase	NumDays	230.00	285.00
tblConstructionPhase	NumDays	20.00	30.00
tblConstructionPhase	NumDays	20.00	30.00
tblConstructionPhase	PhaseEndDate	8/1/2018	6/30/2018
tblConstructionPhase	PhaseEndDate	3/24/2017	4/7/2017
tblConstructionPhase	PhaseStartDate	6/23/2018	5/23/2018
tblConstructionPhase	PhaseStartDate	2/11/2017	2/25/2017
tblGrading	AcresOfGrading	15.00	7.90
tblGrading	MaterialExported	0.00	199.00
tblGrading	MaterialImported	0.00	11,359.00
tblLandUse	LandUseSquareFeet	12,600.00	6,020.00
tblLandUse	LandUseSquareFeet	43,200.00	4,080.00
tblLandUse	LotAcreage	2.27	0.91
tblLandUse	LotAcreage	7.79	6.99
tblLandUse	Population	20.00	21.00
tblLandUse	Population	69.00	73.00
tblProjectCharacteristics	OperationalYear	2014	2018
tblTripsAndVMT	WorkerTripNumber	11.00	14.00
tblTripsAndVMT	WorkerTripNumber	2.00	3.00
tblVehicleTrips	ST_TR	10.08	9.52
tblVehicleTrips	WD_TR	9.57	9.52

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2017	0.4864	3.9414	2.9913	4.3700e-003	0.2141	0.2379	0.4520	0.1076	0.2224	0.3300	0.0000	390.7118	390.7118	0.0855	0.0000	392.5081
2018	0.3292	1.4072	1.1455	1.7700e-003	8.3300e-003	0.0874	0.0957	2.2300e-003	0.0820	0.0843	0.0000	155.9628	155.9628	0.0378	0.0000	156.7567
Total	**0.8156**	**5.3486**	**4.1367**	**6.1400e-003**	**0.2224**	**0.3253**	**0.5478**	**0.1098**	**0.3044**	**0.4142**	**0.0000**	**546.6746**	**546.6746**	**0.1233**	**0.0000**	**549.2648**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2017	0.4859	3.9369	2.9881	4.3600e-003	0.4811	0.2376	0.7187	0.1731	0.2221	0.3952	0.0000	390.3267	390.3267	0.0854	0.0000	392.1209
2018	0.3290	1.4056	1.1442	1.7700e-003	8.3300e-003	0.0873	0.0956	2.2300e-003	0.0819	0.0842	0.0000	155.7884	155.7884	0.0378	0.0000	156.5814
Total	**0.8149**	**5.3425**	**4.1323**	**6.1300e-003**	**0.4894**	**0.3250**	**0.8143**	**0.1753**	**0.3040**	**0.4794**	**0.0000**	**546.1152**	**546.1152**	**0.1232**	**0.0000**	**548.7023**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.0821**	**0.1140**	**0.1068**	**0.1629**	**-120.0252**	**0.1168**	**-48.6682**	**-59.6812**	**0.1183**	**-15.7312**	**0.0000**	**0.1023**	**0.1023**	**0.1135**	**0.0000**	**0.1024**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	3.9527	0.0555	5.0242	1.8800e-003		0.6746	0.6746		0.6746	0.6746	64.0434	27.2349	91.2782	0.0595	5.0400e-003	94.0888
Energy	5.9000e-003	0.0504	0.0215	3.2000e-004		4.0700e-003	4.0700e-003		4.0700e-003	4.0700e-003	0.0000	122.1534	122.1534	4.0000e-003	1.6700e-003	122.7542
Mobile	0.6081	0.6010	2.5955	4.8500e-003	0.3145	7.4700e-003	0.3220	0.0843	6.8800e-003	0.0912	0.0000	364.6582	364.6582	0.0177	0.0000	365.0290
Waste						0.0000	0.0000		0.0000	0.0000	8.3957	0.0000	8.3957	0.4962	0.0000	18.8153
Water						0.0000	0.0000		0.0000	0.0000	0.6408	4.4759	5.1167	0.0660	1.6000e-003	6.9977
Total	**4.5666**	**0.7069**	**7.6411**	**7.0500e-003**	**0.3145**	**0.6861**	**1.0006**	**0.0843**	**0.6855**	**0.7698**	**73.0799**	**518.5224**	**591.6022**	**0.6433**	**8.3100e-003**	**607.6850**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	3.9527	0.0555	5.0242	1.8800e-003		0.6746	0.6746		0.6746	0.6746	64.0434	27.2349	91.2782	0.0595	5.0400e-003	94.0888
Energy	5.9000e-003	0.0504	0.0215	3.2000e-004		4.0700e-003	4.0700e-003		4.0700e-003	4.0700e-003	0.0000	122.1534	122.1534	4.0000e-003	1.6700e-003	122.7542
Mobile	0.6081	0.6010	2.5955	4.8500e-003	0.3145	7.4700e-003	0.3220	0.0843	6.8800e-003	0.0912	0.0000	364.6582	364.6582	0.0177	0.0000	365.0290
Waste						0.0000	0.0000		0.0000	0.0000	8.3957	0.0000	8.3957	0.4962	0.0000	18.8153
Water						0.0000	0.0000		0.0000	0.0000	0.6408	4.4759	5.1167	0.0660	1.5900e-003	6.9967
Total	**4.5666**	**0.7069**	**7.6411**	**7.0500e-003**	**0.3145**	**0.6861**	**1.0006**	**0.0843**	**0.6855**	**0.7698**	**73.0799**	**518.5224**	**591.6022**	**0.6433**	**8.3000e-003**	**607.6840**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**3.1089e-003**	**0.1203**	**1.6785e-004**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2017	1/27/2017	5	20	
2	Site Preparation	Site Preparation	1/28/2017	2/10/2017	5	10	
3	Grading	Grading	2/25/2017	4/7/2017	5	30	
4	Building Construction	Building Construction	4/8/2017	5/11/2018	5	285	
5	Paving	Paving	5/12/2018	6/22/2018	5	30	
6	Architectural Coating	Architectural Coating	5/23/2018	6/30/2018	5	28	

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Demolition	Excavators	3	8.00	162	0.38
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Grading	Excavators	1	8.00	162	0.38
Building Construction	Cranes	1	7.00	226	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Paving	Pavers	2	8.00	125	0.42
Paving	Rollers	2	8.00	80	0.38
Demolition	Rubber Tired Dozers	2	8.00	255	0.40
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Grading	Graders	1	8.00	174	0.41
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Paving	Paving Equipment	2	8.00	130	0.36
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Site Preparation	Rubber Tired Dozers	3	8.00	255	0.40
Building Construction	Welders	1	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	1,445.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	14.00	3.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	3.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2017

Unmitigated Construction On-Site

Acres of Grading: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0405	0.4270	0.3389	4.0000e-004		0.0213	0.0213		0.0198	0.0198	0.0000	36.6182	36.6182	0.0101	0.0000	36.8292
Total	**0.0405**	**0.4270**	**0.3389**	**4.0000e-004**		**0.0213**	**0.0213**		**0.0198**	**0.0198**	**0.0000**	**36.6182**	**36.6182**	**0.0101**	**0.0000**	**36.8292**

3.2 Demolition - 2017

Unmitigated Construction Off-Site

Acres of Grading: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.3000e-003	9.6000e-004	8.5400e-003	1.0000e-005	1.1900e-003	1.0000e-005	1.2000e-003	3.2000e-004	1.0000e-005	3.3000e-004	0.0000	1.0770	1.0770	7.0000e-005	0.0000	1.0785
Total	**2.3000e-003**	**9.6000e-004**	**8.5400e-003**	**1.0000e-005**	**1.1900e-003**	**1.0000e-005**	**1.2000e-003**	**3.2000e-004**	**1.0000e-005**	**3.3000e-004**	**0.0000**	**1.0770**	**1.0770**	**7.0000e-005**	**0.0000**	**1.0785**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0404	0.4265	0.3385	4.0000e-004		0.0212	0.0212		0.0198	0.0198	0.0000	36.5747	36.5747	0.0100	0.0000	36.7854
Total	**0.0404**	**0.4265**	**0.3385**	**4.0000e-004**		**0.0212**	**0.0212**		**0.0198**	**0.0198**	**0.0000**	**36.5747**	**36.5747**	**0.0100**	**0.0000**	**36.7854**

3.2 Demolition - 2017

Mitigated Construction Off-Site

Acres of Grading: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.3000e-003	9.6000e-004	8.5400e-003	1.0000e-005	1.1900e-003	1.0000e-005	1.2000e-003	3.2000e-004	1.0000e-005	3.3000e-004	0.0000	1.0770	1.0770	7.0000e-005	0.0000	1.0785
Total	**2.3000e-003**	**9.6000e-004**	**8.5400e-003**	**1.0000e-005**	**1.1900e-003**	**1.0000e-005**	**1.2000e-003**	**3.2000e-004**	**1.0000e-005**	**3.3000e-004**	**0.0000**	**1.0770**	**1.0770**	**7.0000e-005**	**0.0000**	**1.0785**

3.3 Site Preparation - 2017

Unmitigated Construction On-Site

Acres of Grading: 7.9

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0903	0.0000	0.0903	0.0497	0.0000	0.0497	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0242	0.2588	0.1970	2.0000e-004		0.0138	0.0138		0.0127	0.0127	0.0000	18.1577	18.1577	5.5600e-003	0.0000	18.2745
Total	**0.0242**	**0.2588**	**0.1970**	**2.0000e-004**	**0.0903**	**0.0138**	**0.1041**	**0.0497**	**0.0127**	**0.0623**	**0.0000**	**18.1577**	**18.1577**	**5.5600e-003**	**0.0000**	**18.2745**

3.3 Site Preparation - 2017

Unmitigated Construction Off-Site

Acres of Grading: 7.9

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.3800e-003	5.7000e-004	5.1300e-003	1.0000e-005	7.2000e-004	1.0000e-005	7.2000e-004	1.9000e-004	1.0000e-005	2.0000e-004	0.0000	0.6462	0.6462	4.0000e-005	0.0000	0.6471
Total	**1.3800e-003**	**5.7000e-004**	**5.1300e-003**	**1.0000e-005**	**7.2000e-004**	**1.0000e-005**	**7.2000e-004**	**1.9000e-004**	**1.0000e-005**	**2.0000e-004**	**0.0000**	**0.6462**	**0.6462**	**4.0000e-005**	**0.0000**	**0.6471**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0903	0.0000	0.0903	0.0497	0.0000	0.0497	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0242	0.2585	0.1968	2.0000e-004		0.0138	0.0138		0.0127	0.0127	0.0000	18.1361	18.1361	5.5600e-003	0.0000	18.2528
Total	**0.0242**	**0.2585**	**0.1968**	**2.0000e-004**	**0.0903**	**0.0138**	**0.1041**	**0.0497**	**0.0127**	**0.0623**	**0.0000**	**18.1361**	**18.1361**	**5.5600e-003**	**0.0000**	**18.2528**

3.3 Site Preparation - 2017

Mitigated Construction Off-Site

Acres of Grading: 7.9

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.3800e-003	5.7000e-004	5.1300e-003	1.0000e-005	7.2000e-004	1.0000e-005	7.2000e-004	1.9000e-004	1.0000e-005	2.0000e-004	0.0000	0.6462	0.6462	4.0000e-005	0.0000	0.6471
Total	**1.3800e-003**	**5.7000e-004**	**5.1300e-003**	**1.0000e-005**	**7.2000e-004**	**1.0000e-005**	**7.2000e-004**	**1.9000e-004**	**1.0000e-005**	**2.0000e-004**	**0.0000**	**0.6462**	**0.6462**	**4.0000e-005**	**0.0000**	**0.6471**

3.4 Grading - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0954	0.0000	0.0954	0.0502	0.0000	0.0502	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0518	0.5397	0.3807	4.5000e-004		0.0306	0.0306		0.0281	0.0281	0.0000	41.4175	41.4175	0.0127	0.0000	41.6840
Total	**0.0518**	**0.5397**	**0.3807**	**4.5000e-004**	**0.0954**	**0.0306**	**0.1260**	**0.0502**	**0.0281**	**0.0784**	**0.0000**	**41.4175**	**41.4175**	**0.0127**	**0.0000**	**41.6840**

3.4 Grading - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0410	0.1705	0.2036	5.4000e-004	0.0122	2.5600e-003	0.0148	3.3600e-003	2.3500e-003	5.7200e-003	0.0000	48.1729	48.1729	3.3000e-004	0.0000	48.1800
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.4500e-003	1.4300e-003	0.0128	2.0000e-005	1.7900e-003	2.0000e-005	1.8100e-003	4.8000e-004	2.0000e-005	4.9000e-004	0.0000	1.6155	1.6155	1.1000e-004	0.0000	1.6177
Total	**0.0444**	**0.1719**	**0.2164**	**5.6000e-004**	**0.0140**	**2.5800e-003**	**0.0166**	**3.8400e-003**	**2.3700e-003**	**6.2100e-003**	**0.0000**	**49.7884**	**49.7884**	**4.4000e-004**	**0.0000**	**49.7977**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0954	0.0000	0.0954	0.0502	0.0000	0.0502	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0518	0.5391	0.3803	4.5000e-004		0.0306	0.0306		0.0281	0.0281	0.0000	41.3683	41.3683	0.0127	0.0000	41.6344
Total	**0.0518**	**0.5391**	**0.3803**	**4.5000e-004**	**0.0954**	**0.0306**	**0.1260**	**0.0502**	**0.0281**	**0.0783**	**0.0000**	**41.3683**	**41.3683**	**0.0127**	**0.0000**	**41.6344**

3.4 Grading - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0410	0.1705	0.2036	5.4000e-004	0.2792	2.5600e-003	0.2818	0.0689	2.3500e-003	0.0712	0.0000	48.1729	48.1729	3.3000e-004	0.0000	48.1800
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.4500e-003	1.4300e-003	0.0128	2.0000e-005	1.7900e-003	2.0000e-005	1.8100e-003	4.8000e-004	2.0000e-005	4.9000e-004	0.0000	1.6155	1.6155	1.1000e-004	0.0000	1.6177
Total	**0.0444**	**0.1719**	**0.2164**	**5.6000e-004**	**0.2810**	**2.5800e-003**	**0.2836**	**0.0694**	**2.3700e-003**	**0.0717**	**0.0000**	**49.7884**	**49.7884**	**4.4000e-004**	**0.0000**	**49.7977**

3.5 Building Construction - 2017

Unmitigated Construction On-Site

Acres of Paving: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2947	2.5085	1.7223	2.5500e-003		0.1692	0.1692		0.1589	0.1589	0.0000	227.5052	227.5052	0.0560	0.0000	228.6810
Total	**0.2947**	**2.5085**	**1.7223**	**2.5500e-003**		**0.1692**	**0.1692**		**0.1589**	**0.1589**	**0.0000**	**227.5052**	**227.5052**	**0.0560**	**0.0000**	**228.6810**

3.5 Building Construction - 2017

Unmitigated Construction Off-Site

Acres of Paving: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	6.6500e-003	0.0255	0.0466	7.0000e-005	1.8300e-003	4.0000e-004	2.2300e-003	5.2000e-004	3.7000e-004	8.9000e-004	0.0000	5.9526	5.9526	5.0000e-005	0.0000	5.9536
Worker	0.0204	8.4800e-003	0.0757	1.3000e-004	0.0106	1.0000e-004	0.0107	2.8100e-003	9.0000e-005	2.9100e-003	0.0000	9.5492	9.5492	6.4000e-004	0.0000	9.5626
Total	**0.0271**	**0.0339**	**0.1223**	**2.0000e-004**	**0.0124**	**5.0000e-004**	**0.0129**	**3.3300e-003**	**4.6000e-004**	**3.8000e-003**	**0.0000**	**15.5017**	**15.5017**	**6.9000e-004**	**0.0000**	**15.5161**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2944	2.5056	1.7202	2.5400e-003		0.1690	0.1690		0.1587	0.1587	0.0000	227.2345	227.2345	0.0559	0.0000	228.4090
Total	**0.2944**	**2.5056**	**1.7202**	**2.5400e-003**		**0.1690**	**0.1690**		**0.1587**	**0.1587**	**0.0000**	**227.2345**	**227.2345**	**0.0559**	**0.0000**	**228.4090**

3.5 Building Construction - 2017

Mitigated Construction Off-Site

Acres of Paving: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	6.6500e-003	0.0255	0.0466	7.0000e-005	1.8300e-003	4.0000e-004	2.2300e-003	5.2000e-004	3.7000e-004	8.9000e-004	0.0000	5.9526	5.9526	5.0000e-005	0.0000	5.9536
Worker	0.0204	8.4800e-003	0.0757	1.3000e-004	0.0106	1.0000e-004	0.0107	2.8100e-003	9.0000e-005	2.9100e-003	0.0000	9.5492	9.5492	6.4000e-004	0.0000	9.5626
Total	**0.0271**	**0.0339**	**0.1223**	**2.0000e-004**	**0.0124**	**5.0000e-004**	**0.0129**	**3.3300e-003**	**4.6000e-004**	**3.8000e-003**	**0.0000**	**15.5017**	**15.5017**	**6.9000e-004**	**0.0000**	**15.5161**

3.5 Building Construction - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1268	1.1049	0.8328	1.2700e-003		0.0710	0.0710		0.0667	0.0667	0.0000	112.4656	112.4656	0.0275	0.0000	113.0436
Total	**0.1268**	**1.1049**	**0.8328**	**1.2700e-003**		**0.0710**	**0.0710**		**0.0667**	**0.0667**	**0.0000**	**112.4656**	**112.4656**	**0.0275**	**0.0000**	**113.0436**

3.5 Building Construction - 2018

Unmitigated Construction Off-Site

Acres of Paving: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.1000e-003	0.0115	0.0223	3.0000e-005	9.1000e-004	1.8000e-004	1.0900e-003	2.6000e-004	1.6000e-004	4.2000e-004	0.0000	2.9258	2.9258	2.0000e-005	0.0000	2.9263
Worker	9.2500e-003	3.7900e-003	0.0335	7.0000e-005	5.2900e-003	5.0000e-005	5.3400e-003	1.4100e-003	5.0000e-005	1.4500e-003	0.0000	4.5977	4.5977	2.9000e-004	0.0000	4.6039
Total	**0.0124**	**0.0153**	**0.0558**	**1.0000e-004**	**6.2000e-003**	**2.3000e-004**	**6.4300e-003**	**1.6700e-003**	**2.1000e-004**	**1.8700e-003**	**0.0000**	**7.5235**	**7.5235**	**3.1000e-004**	**0.0000**	**7.5301**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1266	1.1036	0.8318	1.2700e-003		0.0709	0.0709		0.0667	0.0667	0.0000	112.3318	112.3318	0.0275	0.0000	112.9091
Total	**0.1266**	**1.1036**	**0.8318**	**1.2700e-003**		**0.0709**	**0.0709**		**0.0667**	**0.0667**	**0.0000**	**112.3318**	**112.3318**	**0.0275**	**0.0000**	**112.9091**

3.5 Building Construction - 2018

Mitigated Construction Off-Site

Acres of Paving: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.1000e-003	0.0115	0.0223	3.0000e-005	9.1000e-004	1.8000e-004	1.0900e-003	2.6000e-004	1.6000e-004	4.2000e-004	0.0000	2.9258	2.9258	2.0000e-005	0.0000	2.9263
Worker	9.2500e-003	3.7900e-003	0.0335	7.0000e-005	5.2900e-003	5.0000e-005	5.3400e-003	1.4100e-003	5.0000e-005	1.4500e-003	0.0000	4.5977	4.5977	2.9000e-004	0.0000	4.6039
Total	**0.0124**	**0.0153**	**0.0558**	**1.0000e-004**	**6.2000e-003**	**2.3000e-004**	**6.4300e-003**	**1.6700e-003**	**2.1000e-004**	**1.8700e-003**	**0.0000**	**7.5235**	**7.5235**	**3.1000e-004**	**0.0000**	**7.5301**

3.6 Paving - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0242	0.2574	0.2174	3.3000e-004		0.0141	0.0141		0.0130	0.0130	0.0000	30.5531	30.5531	9.5100e-003	0.0000	30.7529
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0242**	**0.2574**	**0.2174**	**3.3000e-004**		**0.0141**	**0.0141**		**0.0130**	**0.0130**	**0.0000**	**30.5531**	**30.5531**	**9.5100e-003**	**0.0000**	**30.7529**

3.6 Paving - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.1300e-003	1.2800e-003	0.0113	2.0000e-005	1.7900e-003	2.0000e-005	1.8100e-003	4.8000e-004	2.0000e-005	4.9000e-004	0.0000	1.5556	1.5556	1.0000e-004	0.0000	1.5577
Total	**3.1300e-003**	**1.2800e-003**	**0.0113**	**2.0000e-005**	**1.7900e-003**	**2.0000e-005**	**1.8100e-003**	**4.8000e-004**	**2.0000e-005**	**4.9000e-004**	**0.0000**	**1.5556**	**1.5556**	**1.0000e-004**	**0.0000**	**1.5577**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0241	0.2571	0.2172	3.3000e-004		0.0141	0.0141		0.0129	0.0129	0.0000	30.5168	30.5168	9.5000e-003	0.0000	30.7163
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0241**	**0.2571**	**0.2172**	**3.3000e-004**		**0.0141**	**0.0141**		**0.0129**	**0.0129**	**0.0000**	**30.5168**	**30.5168**	**9.5000e-003**	**0.0000**	**30.7163**

3.6 Paving - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.1300e-003	1.2800e-003	0.0113	2.0000e-005	1.7900e-003	2.0000e-005	1.8100e-003	4.8000e-004	2.0000e-005	4.9000e-004	0.0000	1.5556	1.5556	1.0000e-004	0.0000	1.5577
Total	**3.1300e-003**	**1.2800e-003**	**0.0113**	**2.0000e-005**	**1.7900e-003**	**2.0000e-005**	**1.8100e-003**	**4.8000e-004**	**2.0000e-005**	**4.9000e-004**	**0.0000**	**1.5556**	**1.5556**	**1.0000e-004**	**0.0000**	**1.5577**

3.7 Architectural Coating - 2018

Unmitigated Construction On-Site

Residential Indoor: 20,453; Residential Outdoor: 6,818; Non-Residential Indoor: 0; Non-Residential Outdoor: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.1580					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	4.1800e-003	0.0281	0.0260	4.0000e-005		2.1100e-003	2.1100e-003		2.1100e-003	2.1100e-003	0.0000	3.5746	3.5746	3.4000e-004	0.0000	3.5817
Total	**0.1622**	**0.0281**	**0.0260**	**4.0000e-005**		**2.1100e-003**	**2.1100e-003**		**2.1100e-003**	**2.1100e-003**	**0.0000**	**3.5746**	**3.5746**	**3.4000e-004**	**0.0000**	**3.5817**

3.7 Architectural Coating - 2018

Unmitigated Construction Off-Site

Residential Indoor: 20,453; Residential Outdoor: 6,818; Non-Residential Indoor: 0; Non-Residential Outdoor: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.8000e-004	2.4000e-004	2.1200e-003	0.0000	3.3000e-004	0.0000	3.4000e-004	9.0000e-005	0.0000	9.0000e-005	0.0000	0.2904	0.2904	2.0000e-005	0.0000	0.2908
Total	**5.8000e-004**	**2.4000e-004**	**2.1200e-003**	**0.0000**	**3.3000e-004**	**0.0000**	**3.4000e-004**	**9.0000e-005**	**0.0000**	**9.0000e-005**	**0.0000**	**0.2904**	**0.2904**	**2.0000e-005**	**0.0000**	**0.2908**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.1580					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	4.1800e-003	0.0281	0.0259	4.0000e-005		2.1100e-003	2.1100e-003		2.1100e-003	2.1100e-003	0.0000	3.5703	3.5703	3.4000e-004	0.0000	3.5774
Total	**0.1622**	**0.0281**	**0.0259**	**4.0000e-005**		**2.1100e-003**	**2.1100e-003**		**2.1100e-003**	**2.1100e-003**	**0.0000**	**3.5703**	**3.5703**	**3.4000e-004**	**0.0000**	**3.5774**

3.7 Architectural Coating - 2018

Mitigated Construction Off-Site

Residential Indoor: 20,453; Residential Outdoor: 6,818; Non-Residential Indoor: 0; Non-Residential Outdoor: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.8000e-004	2.4000e-004	2.1200e-003	0.0000	3.3000e-004	0.0000	3.4000e-004	9.0000e-005	0.0000	9.0000e-005	0.0000	0.2904	0.2904	2.0000e-005	0.0000	0.2908
Total	**5.8000e-004**	**2.4000e-004**	**2.1200e-003**	**0.0000**	**3.3000e-004**	**0.0000**	**3.4000e-004**	**9.0000e-005**	**0.0000**	**9.0000e-005**	**0.0000**	**0.2904**	**0.2904**	**2.0000e-005**	**0.0000**	**0.2908**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.6081	0.6010	2.5955	4.8500e-003	0.3145	7.4700e-003	0.3220	0.0843	6.8800e-003	0.0912	0.0000	364.6582	364.6582	0.0177	0.0000	365.0290
Unmitigated	0.6081	0.6010	2.5955	4.8500e-003	0.3145	7.4700e-003	0.3220	0.0843	6.8800e-003	0.0912	0.0000	364.6582	364.6582	0.0177	0.0000	365.0290

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Single Family Housing	66.64	66.64	61.39	189,822	189,822
Single Family Housing	228.48	228.48	210.48	650,818	650,818
Total	295.12	295.12	271.87	840,639	840,639

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Single Family Housing	10.80	7.30	7.50	44.00	18.80	37.20	86	11	3
Single Family Housing	10.80	7.30	7.50	44.00	18.80	37.20	86	11	3

4.4 Fleet Mix

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.463934	0.038758	0.210530	0.164352	0.051306	0.007282	0.016583	0.030323	0.003051	0.002171	0.008186	0.000820	0.002705

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	63.7856	63.7856	2.8800e-003	6.0000e-004	64.0311
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	63.7856	63.7856	2.8800e-003	6.0000e-004	64.0311
NaturalGas Mitigated	5.9000e-003	0.0504	0.0215	3.2000e-004		4.0700e-003	4.0700e-003		4.0700e-003	4.0700e-003	0.0000	58.3678	58.3678	1.1200e-003	1.0700e-003	58.7230
NaturalGas Unmitigated	5.9000e-003	0.0504	0.0215	3.2000e-004		4.0700e-003	4.0700e-003		4.0700e-003	4.0700e-003	0.0000	58.3678	58.3678	1.1200e-003	1.0700e-003	58.7230

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Single Family Housing	246981	1.3300e-003	0.0114	4.8400e-003	7.0000e-005		9.2000e-004	9.2000e-004		9.2000e-004	9.2000e-004	0.0000	13.1798	13.1798	2.5000e-004	2.4000e-004	13.2600
Single Family Housing	846791	4.5700e-003	0.0390	0.0166	2.5000e-004		3.1500e-003	3.1500e-003		3.1500e-003	3.1500e-003	0.0000	45.1880	45.1880	8.7000e-004	8.3000e-004	45.4630
Total		**5.9000e-003**	**0.0504**	**0.0214**	**3.2000e-004**		**4.0700e-003**	**4.0700e-003**		**4.0700e-003**	**4.0700e-003**	**0.0000**	**58.3678**	**58.3678**	**1.1200e-003**	**1.0700e-003**	**58.7230**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Single Family Housing	246981	1.3300e-003	0.0114	4.8400e-003	7.0000e-005		9.2000e-004	9.2000e-004		9.2000e-004	9.2000e-004	0.0000	13.1798	13.1798	2.5000e-004	2.4000e-004	13.2600
Single Family Housing	846791	4.5700e-003	0.0390	0.0166	2.5000e-004		3.1500e-003	3.1500e-003		3.1500e-003	3.1500e-003	0.0000	45.1880	45.1880	8.7000e-004	8.3000e-004	45.4630
Total		**5.9000e-003**	**0.0504**	**0.0214**	**3.2000e-004**		**4.0700e-003**	**4.0700e-003**		**4.0700e-003**	**4.0700e-003**	**0.0000**	**58.3678**	**58.3678**	**1.1200e-003**	**1.0700e-003**	**58.7230**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Single Family Housing	169751	49.3824	2.2300e-003	4.6000e-004	49.5725
Single Family Housing	49510.6	14.4032	6.5000e-004	1.3000e-004	14.4586
Total		**63.7856**	**2.8800e-003**	**5.9000e-004**	**64.0311**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Single Family Housing	169751	49.3824	2.2300e-003	4.6000e-004	49.5725
Single Family Housing	49510.6	14.4032	6.5000e-004	1.3000e-004	14.4586
Total		**63.7856**	**2.8800e-003**	**5.9000e-004**	**64.0311**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	3.9527	0.0555	5.0242	1.8800e-003		0.6746	0.6746		0.6746	0.6746	64.0434	27.2349	91.2782	0.0595	5.0400e-003	94.0888
Unmitigated	3.9527	0.0555	5.0242	1.8800e-003		0.6746	0.6746		0.6746	0.6746	64.0434	27.2349	91.2782	0.0595	5.0400e-003	94.0888

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0158					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0395					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	3.8903	0.0528	4.7924	1.8700e-003		0.6733	0.6733		0.6733	0.6733	64.0434	26.8589	90.9022	0.0591	5.0400e-003	93.7050
Landscaping	7.1500e-003	2.6900e-003	0.2318	1.0000e-005		1.2700e-003	1.2700e-003		1.2700e-003	1.2700e-003	0.0000	0.3760	0.3760	3.7000e-004	0.0000	0.3838
Total	**3.9527**	**0.0555**	**5.0242**	**1.8800e-003**		**0.6746**	**0.6746**		**0.6746**	**0.6746**	**64.0434**	**27.2349**	**91.2782**	**0.0595**	**5.0400e-003**	**94.0888**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0158					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0395					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	3.8903	0.0528	4.7924	1.8700e-003		0.6733	0.6733		0.6733	0.6733	64.0434	26.8589	90.9022	0.0591	5.0400e-003	93.7050
Landscaping	7.1500e-003	2.6900e-003	0.2318	1.0000e-005		1.2700e-003	1.2700e-003		1.2700e-003	1.2700e-003	0.0000	0.3760	0.3760	3.7000e-004	0.0000	0.3838
Total	**3.9527**	**0.0555**	**5.0242**	**1.8800e-003**		**0.6746**	**0.6746**		**0.6746**	**0.6746**	**64.0434**	**27.2349**	**91.2782**	**0.0595**	**5.0400e-003**	**94.0888**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	5.1167	0.0660	1.5900e-003	6.9967
Unmitigated	5.1167	0.0660	1.6000e-003	6.9977

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Single Family Housing	2.01977 / 1.27334	5.1167	0.0660	1.6000e-003	6.9977
Total		**5.1167**	**0.0660**	**1.6000e-003**	**6.9977**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Single Family Housing	2.01977 / 1.27334	5.1167	0.0660	1.5900e-003	6.9967
Total		**5.1167**	**0.0660**	**1.5900e-003**	**6.9967**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	8.3957	0.4962	0.0000	18.8153
Unmitigated	8.3957	0.4962	0.0000	18.8153

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Single Family Housing	41.36	8.3957	0.4962	0.0000	18.8153
Total		**8.3957**	**0.4962**	**0.0000**	**18.8153**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Single Family Housing	41.36	8.3957	0.4962	0.0000	18.8153
Total		**8.3957**	**0.4962**	**0.0000**	**18.8153**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

Carmel Rio Road

North Central Coast Air Basin, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Single Family Housing	7.00	Dwelling Unit	0.91	6,020.00	21
Single Family Housing	24.00	Dwelling Unit	6.99	4,080.00	73

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.8	**Precipitation Freq (Days)**	53
Climate Zone	4			**Operational Year**	2018
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - From project description

Construction Phase - Reflects 18-month construction schedule

Grading - From project plans

Vehicle Trips - From project traffic study

Table Name	Column Name	Default Value	New Value
tblAreaMitigation	UseLowVOCPaintNonresidentialExteriorValue	250	0
tblAreaMitigation	UseLowVOCPaintNonresidentialInteriorValue	250	0
tblAreaMitigation	UseLowVOCPaintResidentialExteriorValue	250	0
tblAreaMitigation	UseLowVOCPaintResidentialInteriorValue	250	0
tblConstructionPhase	NumDays	20.00	28.00
tblConstructionPhase	NumDays	230.00	285.00
tblConstructionPhase	NumDays	20.00	30.00
tblConstructionPhase	NumDays	20.00	30.00
tblConstructionPhase	PhaseEndDate	8/1/2018	6/30/2018
tblConstructionPhase	PhaseEndDate	3/24/2017	4/7/2017
tblConstructionPhase	PhaseStartDate	6/23/2018	5/23/2018
tblConstructionPhase	PhaseStartDate	2/11/2017	2/25/2017
tblGrading	AcresOfGrading	15.00	7.90
tblGrading	MaterialExported	0.00	199.00
tblGrading	MaterialImported	0.00	11,359.00
tblLandUse	LandUseSquareFeet	12,600.00	6,020.00
tblLandUse	LandUseSquareFeet	43,200.00	4,080.00
tblLandUse	LotAcreage	2.27	0.91
tblLandUse	LotAcreage	7.79	6.99
tblLandUse	Population	20.00	21.00
tblLandUse	Population	69.00	73.00
tblProjectCharacteristics	OperationalYear	2014	2018
tblTripsAndVMT	WorkerTripNumber	11.00	14.00
tblTripsAndVMT	WorkerTripNumber	2.00	3.00
tblVehicleTrips	ST_TR	10.08	9.52
tblVehicleTrips	WD_TR	9.57	9.52

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	6.2652	51.8538	40.4459	0.0670	18.2141	2.7556	20.9697	9.9699	2.5352	12.5051	0.0000	6,712.8428	6,712.8428	1.2361	0.0000	6,738.8000
2018	13.4294	23.5643	18.5995	0.0290	0.1479	1.4991	1.6338	0.0392	1.4092	1.4453	0.0000	2,790.9161	2,790.9161	0.7344	0.0000	2,806.3387
Total	**19.6946**	**75.4181**	**59.0454**	**0.0960**	**18.3620**	**4.2547**	**22.6035**	**10.0091**	**3.9443**	**13.9504**	**0.0000**	**9,503.7589**	**9,503.7589**	**1.9705**	**0.0000**	**9,545.1387**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	6.2621	51.8063	40.4097	0.0670	25.7911	2.7531	27.9995	9.9699	2.5328	12.5027	0.0000	6,710.0504	6,710.0504	1.2349	0.0000	6,735.9840
2018	13.4276	23.5430	18.5834	0.0289	0.1479	1.4977	1.6324	0.0392	1.4079	1.4440	0.0000	2,788.5216	2,788.5216	0.7337	0.0000	2,803.9302
Total	**19.6897**	**75.3493**	**58.9931**	**0.0960**	**25.9390**	**4.2508**	**29.6320**	**10.0091**	**3.9407**	**13.9468**	**0.0000**	**9,498.5720**	**9,498.5720**	**1.9687**	**0.0000**	**9,539.9142**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.0250**	**0.0913**	**0.0885**	**0.0417**	**-41.2646**	**0.0914**	**-31.0944**	**0.0000**	**0.0915**	**0.0258**	**0.0000**	**0.0546**	**0.0546**	**0.0908**	**0.0000**	**0.0547**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	95.2666	1.3172	119.4631	0.0458		16.4360	16.4360		16.4356	16.4356	1,721.8473	726.7228	2,448.5701	1.5935	0.1354	2,524.0197
Energy	0.0323	0.2762	0.1175	1.7600e-003		0.0223	0.0223		0.0223	0.0223		352.5453	352.5453	6.7600e-003	6.4600e-003	354.6908
Mobile	3.1758	3.1010	13.6525	0.0282	1.8037	0.0415	1.8452	0.4820	0.0382	0.5203		2,329.8129	2,329.8129	0.1082		2,332.0859
Total	**98.4747**	**4.6944**	**133.2332**	**0.0757**	**1.8037**	**16.4999**	**18.3036**	**0.4820**	**16.4961**	**16.9782**	**1,721.8473**	**3,409.0810**	**5,130.9283**	**1.7085**	**0.1419**	**5,210.7964**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	95.2666	1.3172	119.4631	0.0458		16.4360	16.4360		16.4356	16.4356	1,721.8473	726.7228	2,448.5701	1.5935	0.1354	2,524.0197
Energy	0.0323	0.2762	0.1175	1.7600e-003		0.0223	0.0223		0.0223	0.0223		352.5453	352.5453	6.7600e-003	6.4600e-003	354.6908
Mobile	3.1758	3.1010	13.6525	0.0282	1.8037	0.0415	1.8452	0.4820	0.0382	0.5203		2,329.8129	2,329.8129	0.1082		2,332.0859
Total	**98.4747**	**4.6944**	**133.2332**	**0.0757**	**1.8037**	**16.4999**	**18.3036**	**0.4820**	**16.4961**	**16.9782**	**1,721.8473**	**3,409.0810**	**5,130.9283**	**1.7085**	**0.1419**	**5,210.7964**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2017	1/27/2017	5	20	
2	Site Preparation	Site Preparation	1/28/2017	2/10/2017	5	10	
3	Grading	Grading	2/25/2017	4/7/2017	5	30	
4	Building Construction	Building Construction	4/8/2017	5/11/2018	5	285	
5	Paving	Paving	5/12/2018	6/22/2018	5	30	
6	Architectural Coating	Architectural Coating	5/23/2018	6/30/2018	5	28	

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Demolition	Excavators	3	8.00	162	0.38
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Grading	Excavators	1	8.00	162	0.38
Building Construction	Cranes	1	7.00	226	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Paving	Pavers	2	8.00	125	0.42
Paving	Rollers	2	8.00	80	0.38
Demolition	Rubber Tired Dozers	2	8.00	255	0.40
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Grading	Graders	1	8.00	174	0.41
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Paving	Paving Equipment	2	8.00	130	0.36
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Site Preparation	Rubber Tired Dozers	3	8.00	255	0.40
Building Construction	Welders	1	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	1,445.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	14.00	3.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	3.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2017

Unmitigated Construction On-Site

Acres of Grading: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	4.0482	42.6971	33.8934	0.0399		2.1252	2.1252		1.9797	1.9797		4,036.4674	4,036.4674	1.1073		4,059.7211
Total	**4.0482**	**42.6971**	**33.8934**	**0.0399**		**2.1252**	**2.1252**		**1.9797**	**1.9797**		**4,036.4674**	**4,036.4674**	**1.1073**		**4,059.7211**

3.2 Demolition - 2017

Unmitigated Construction Off-Site

Acres of Grading: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2148	0.0836	0.8740	1.5600e-003	0.1232	1.1600e-003	0.1244	0.0327	1.0700e-003	0.0338		125.5559	125.5559	7.9400e-003		125.7226
Total	**0.2148**	**0.0836**	**0.8740**	**1.5600e-003**	**0.1232**	**1.1600e-003**	**0.1244**	**0.0327**	**1.0700e-003**	**0.0338**		**125.5559**	**125.5559**	**7.9400e-003**		**125.7226**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	4.0445	42.6579	33.8623	0.0399		2.1233	2.1233		1.9779	1.9779	0.0000	4,032.7641	4,032.7641	1.1063		4,055.9965
Total	**4.0445**	**42.6579**	**33.8623**	**0.0399**		**2.1233**	**2.1233**		**1.9779**	**1.9779**	**0.0000**	**4,032.7641**	**4,032.7641**	**1.1063**		**4,055.9965**

3.2 Demolition - 2017

Mitigated Construction Off-Site

Acres of Grading: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2148	0.0836	0.8740	1.5600e-003	0.1232	1.1600e-003	0.1244	0.0327	1.0700e-003	0.0338		125.5559	125.5559	7.9400e-003		125.7226
Total	**0.2148**	**0.0836**	**0.8740**	**1.5600e-003**	**0.1232**	**1.1600e-003**	**0.1244**	**0.0327**	**1.0700e-003**	**0.0338**		**125.5559**	**125.5559**	**7.9400e-003**		**125.7226**

3.3 Site Preparation - 2017

Unmitigated Construction On-Site

Acres of Grading: 7.9

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Off-Road	4.8382	51.7535	39.3970	0.0391		2.7542	2.7542		2.5339	2.5339		4,003.0859	4,003.0859	1.2265		4,028.8432
Total	**4.8382**	**51.7535**	**39.3970**	**0.0391**	**18.0663**	**2.7542**	**20.8205**	**9.9307**	**2.5339**	**12.4646**		**4,003.0859**	**4,003.0859**	**1.2265**		**4,028.8432**

3.3 Site Preparation - 2017

Unmitigated Construction Off-Site

Acres of Grading: 7.9

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2578	0.1003	1.0488	1.8800e-003	0.1479	1.4000e-003	0.1493	0.0392	1.2800e-003	0.0405		150.6671	150.6671	9.5200e-003		150.8671
Total	**0.2578**	**0.1003**	**1.0488**	**1.8800e-003**	**0.1479**	**1.4000e-003**	**0.1493**	**0.0392**	**1.2800e-003**	**0.0405**		**150.6671**	**150.6671**	**9.5200e-003**		**150.8671**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Off-Road	4.8338	51.7060	39.3609	0.0391		2.7517	2.7517		2.5316	2.5316	0.0000	3,999.4133	3,999.4133	1.2254		4,025.1470
Total	**4.8338**	**51.7060**	**39.3609**	**0.0391**	**18.0663**	**2.7517**	**20.8180**	**9.9307**	**2.5316**	**12.4622**	**0.0000**	**3,999.4133**	**3,999.4133**	**1.2254**		**4,025.1470**

3.3 Site Preparation - 2017

Mitigated Construction Off-Site

Acres of Grading: 7.9

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2578	0.1003	1.0488	1.8800e-003	0.1479	1.4000e-003	0.1493	0.0392	1.2800e-003	0.0405		150.6671	150.6671	9.5200e-003		150.8671
Total	**0.2578**	**0.1003**	**1.0488**	**1.8800e-003**	**0.1479**	**1.4000e-003**	**0.1493**	**0.0392**	**1.2800e-003**	**0.0405**		**150.6671**	**150.6671**	**9.5200e-003**		**150.8671**

3.4 Grading - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.3610	0.0000	6.3610	3.3494	0.0000	3.3494			0.0000			0.0000
Off-Road	3.4555	35.9825	25.3812	0.0297		2.0388	2.0388		1.8757	1.8757		3,043.6667	3,043.6667	0.9326		3,063.2507
Total	**3.4555**	**35.9825**	**25.3812**	**0.0297**	**6.3610**	**2.0388**	**8.3998**	**3.3494**	**1.8757**	**5.2251**		**3,043.6667**	**3,043.6667**	**0.9326**		**3,063.2507**

3.4 Grading - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	2.5949	10.9303	10.2739	0.0357	0.8392	0.1703	1.0096	0.2298	0.1567	0.3865		3,543.6202	3,543.6202	0.0245		3,544.1338
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2148	0.0836	0.8740	1.5600e-003	0.1232	1.1600e-003	0.1244	0.0327	1.0700e-003	0.0338		125.5559	125.5559	7.9400e-003		125.7226
Total	**2.8097**	**11.0139**	**11.1480**	**0.0373**	**0.9625**	**0.1715**	**1.1339**	**0.2625**	**0.1578**	**0.4203**		**3,669.1761**	**3,669.1761**	**0.0324**		**3,669.8563**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.3610	0.0000	6.3610	3.3494	0.0000	3.3494			0.0000			0.0000
Off-Road	3.4524	35.9494	25.3579	0.0297		2.0369	2.0369		1.8740	1.8740	0.0000	3,040.8743	3,040.8743	0.9317		3,060.4404
Total	**3.4524**	**35.9494**	**25.3579**	**0.0297**	**6.3610**	**2.0369**	**8.3979**	**3.3494**	**1.8740**	**5.2234**	**0.0000**	**3,040.8743**	**3,040.8743**	**0.9317**		**3,060.4404**

3.4 Grading - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	2.5949	10.9303	10.2739	0.0357	19.3069	0.1703	19.4773	4.7628	0.1567	4.9195		3,543.6202	3,543.6202	0.0245		3,544.1338
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2148	0.0836	0.8740	1.5600e-003	0.1232	1.1600e-003	0.1244	0.0327	1.0700e-003	0.0338		125.5559	125.5559	7.9400e-003		125.7226
Total	**2.8097**	**11.0139**	**11.1480**	**0.0373**	**19.4302**	**0.1715**	**19.6016**	**4.7955**	**0.1578**	**4.9532**		**3,669.1761**	**3,669.1761**	**0.0324**		**3,669.8563**

3.5 Building Construction - 2017

Unmitigated Construction On-Site

Acres of Paving: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.1024	26.4057	18.1291	0.0268		1.7812	1.7812		1.6730	1.6730		2,639.8053	2,639.8053	0.6497		2,653.4490
Total	**3.1024**	**26.4057**	**18.1291**	**0.0268**		**1.7812**	**1.7812**		**1.6730**	**1.6730**		**2,639.8053**	**2,639.8053**	**0.6497**		**2,653.4490**

3.5 Building Construction - 2017

Unmitigated Construction Off-Site

Acres of Paving: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0646	0.2587	0.3572	7.0000e-004	0.0197	4.2000e-003	0.0239	5.6100e-003	3.8600e-003	9.4700e-003		69.2953	69.2953	5.4000e-004		69.3067
Worker	0.2005	0.0780	0.8158	1.4600e-003	0.1150	1.0900e-003	0.1161	0.0305	1.0000e-003	0.0315		117.1855	117.1855	7.4100e-003		117.3411
Total	**0.2651**	**0.3367**	**1.1730**	**2.1600e-003**	**0.1348**	**5.2900e-003**	**0.1400**	**0.0361**	**4.8600e-003**	**0.0410**		**186.4809**	**186.4809**	**7.9500e-003**		**186.6478**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.0995	26.3814	18.1125	0.0268		1.7796	1.7796		1.6714	1.6714	0.0000	2,637.3834	2,637.3834	0.6491		2,651.0146
Total	**3.0995**	**26.3814**	**18.1125**	**0.0268**		**1.7796**	**1.7796**		**1.6714**	**1.6714**	**0.0000**	**2,637.3834**	**2,637.3834**	**0.6491**		**2,651.0146**

3.5 Building Construction - 2017

Mitigated Construction Off-Site

Acres of Paving: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0646	0.2587	0.3572	7.0000e-004	0.0197	4.2000e-003	0.0239	5.6100e-003	3.8600e-003	9.4700e-003		69.2953	69.2953	5.4000e-004		69.3067
Worker	0.2005	0.0780	0.8158	1.4600e-003	0.1150	1.0900e-003	0.1161	0.0305	1.0000e-003	0.0315		117.1855	117.1855	7.4100e-003		117.3411
Total	**0.2651**	**0.3367**	**1.1730**	**2.1600e-003**	**0.1348**	**5.2900e-003**	**0.1400**	**0.0361**	**4.8600e-003**	**0.0410**		**186.4809**	**186.4809**	**7.9500e-003**		**186.6478**

3.5 Building Construction - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.6687	23.2608	17.5327	0.0268		1.4943	1.4943		1.4048	1.4048		2,609.9390	2,609.9390	0.6387		2,623.3517
Total	**2.6687**	**23.2608**	**17.5327**	**0.0268**		**1.4943**	**1.4943**		**1.4048**	**1.4048**		**2,609.9390**	**2,609.9390**	**0.6387**		**2,623.3517**

3.5 Building Construction - 2018

Unmitigated Construction Off-Site

Acres of Paving: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0602	0.2337	0.3404	7.0000e-004	0.0197	3.7500e-003	0.0235	5.6100e-003	3.4500e-003	9.0500e-003		68.1207	68.1207	5.2000e-004		68.1316
Worker	0.1816	0.0698	0.7264	1.4600e-003	0.1150	1.0300e-003	0.1160	0.0305	9.5000e-004	0.0315		112.8564	112.8564	6.7500e-003		112.9983
Total	**0.2418**	**0.3035**	**1.0668**	**2.1600e-003**	**0.1348**	**4.7800e-003**	**0.1395**	**0.0361**	**4.4000e-003**	**0.0405**		**180.9772**	**180.9772**	**7.2700e-003**		**181.1299**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.6662	23.2395	17.5166	0.0268		1.4929	1.4929		1.4035	1.4035	0.0000	2,607.5445	2,607.5445	0.6381		2,620.9449
Total	**2.6662**	**23.2395**	**17.5166**	**0.0268**		**1.4929**	**1.4929**		**1.4035**	**1.4035**	**0.0000**	**2,607.5445**	**2,607.5445**	**0.6381**		**2,620.9449**

3.5 Building Construction - 2018

Mitigated Construction Off-Site

Acres of Paving: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0602	0.2337	0.3404	7.0000e-004	0.0197	3.7500e-003	0.0235	5.6100e-003	3.4500e-003	9.0500e-003		68.1207	68.1207	5.2000e-004		68.1316
Worker	0.1816	0.0698	0.7264	1.4600e-003	0.1150	1.0300e-003	0.1160	0.0305	9.5000e-004	0.0315		112.8564	112.8564	6.7500e-003		112.9983
Total	**0.2418**	**0.3035**	**1.0668**	**2.1600e-003**	**0.1348**	**4.7800e-003**	**0.1395**	**0.0361**	**4.4000e-003**	**0.0405**		**180.9772**	**180.9772**	**7.2700e-003**		**181.1299**

3.6 Paving - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6114	17.1628	14.4944	0.0223		0.9386	0.9386		0.8635	0.8635		2,245.2695	2,245.2695	0.6990		2,259.9481
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.6114**	**17.1628**	**14.4944**	**0.0223**		**0.9386**	**0.9386**		**0.8635**	**0.8635**		**2,245.2695**	**2,245.2695**	**0.6990**		**2,259.9481**

3.6 Paving - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1946	0.0747	0.7783	1.5600e-003	0.1232	1.1100e-003	0.1243	0.0327	1.0200e-003	0.0337		120.9176	120.9176	7.2400e-003		121.0696
Total	**0.1946**	**0.0747**	**0.7783**	**1.5600e-003**	**0.1232**	**1.1100e-003**	**0.1243**	**0.0327**	**1.0200e-003**	**0.0337**		**120.9176**	**120.9176**	**7.2400e-003**		**121.0696**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6099	17.1470	14.4811	0.0223		0.9378	0.9378		0.8628	0.8628	0.0000	2,243.2096	2,243.2096	0.6983		2,257.8747
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.6099**	**17.1470**	**14.4811**	**0.0223**		**0.9378**	**0.9378**		**0.8628**	**0.8628**	**0.0000**	**2,243.2096**	**2,243.2096**	**0.6983**		**2,257.8747**

3.6 Paving - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1946	0.0747	0.7783	1.5600e-003	0.1232	1.1100e-003	0.1243	0.0327	1.0200e-003	0.0337		120.9176	120.9176	7.2400e-003		121.0696
Total	**0.1946**	**0.0747**	**0.7783**	**1.5600e-003**	**0.1232**	**1.1100e-003**	**0.1243**	**0.0327**	**1.0200e-003**	**0.0337**		**120.9176**	**120.9176**	**7.2400e-003**		**121.0696**

3.7 Architectural Coating - 2018

Unmitigated Construction On-Site

Residential Indoor: 20,453; Residential Outdoor: 6,818; Non-Residential Indoor: 0; Non-Residential Outdoor: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	11.2858					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2986	2.0058	1.8542	2.9700e-003		0.1506	0.1506		0.1506	0.1506		281.4485	281.4485	0.0267		282.0102
Total	**11.5844**	**2.0058**	**1.8542**	**2.9700e-003**		**0.1506**	**0.1506**		**0.1506**	**0.1506**		**281.4485**	**281.4485**	**0.0267**		**282.0102**

3.7 Architectural Coating - 2018

Unmitigated Construction Off-Site

Residential Indoor: 20,453; Residential Outdoor: 6,818; Non-Residential Indoor: 0; Non-Residential Outdoor: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0389	0.0150	0.1557	3.1000e-004	0.0246	2.2000e-004	0.0249	6.5400e-003	2.0000e-004	6.7400e-003		24.1835	24.1835	1.4500e-003		24.2139
Total	**0.0389**	**0.0150**	**0.1557**	**3.1000e-004**	**0.0246**	**2.2000e-004**	**0.0249**	**6.5400e-003**	**2.0000e-004**	**6.7400e-003**		**24.1835**	**24.1835**	**1.4500e-003**		**24.2139**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	11.2858					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2984	2.0039	1.8525	2.9700e-003		0.1504	0.1504		0.1504	0.1504	0.0000	281.1903	281.1903	0.0267		281.7514
Total	**11.5842**	**2.0039**	**1.8525**	**2.9700e-003**		**0.1504**	**0.1504**		**0.1504**	**0.1504**	**0.0000**	**281.1903**	**281.1903**	**0.0267**		**281.7514**

3.7 Architectural Coating - 2018

Mitigated Construction Off-Site

Residential Indoor: 20,453; Residential Outdoor: 6,818; Non-Residential Indoor: 0; Non-Residential Outdoor: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0389	0.0150	0.1557	3.1000e-004	0.0246	2.2000e-004	0.0249	6.5400e-003	2.0000e-004	6.7400e-003		24.1835	24.1835	1.4500e-003		24.2139
Total	**0.0389**	**0.0150**	**0.1557**	**3.1000e-004**	**0.0246**	**2.2000e-004**	**0.0249**	**6.5400e-003**	**2.0000e-004**	**6.7400e-003**		**24.1835**	**24.1835**	**1.4500e-003**		**24.2139**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	3.1758	3.1010	13.6525	0.0282	1.8037	0.0415	1.8452	0.4820	0.0382	0.5203		2,329.8129	2,329.8129	0.1082		2,332.0859
Unmitigated	3.1758	3.1010	13.6525	0.0282	1.8037	0.0415	1.8452	0.4820	0.0382	0.5203		2,329.8129	2,329.8129	0.1082		2,332.0859

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Single Family Housing	66.64	66.64	61.39	189,822	189,822
Single Family Housing	228.48	228.48	210.48	650,818	650,818
Total	295.12	295.12	271.87	840,639	840,639

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Single Family Housing	10.80	7.30	7.50	44.00	18.80	37.20	86	11	3
Single Family Housing	10.80	7.30	7.50	44.00	18.80	37.20	86	11	3

4.4 Fleet Mix

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.463934	0.038758	0.210530	0.164352	0.051306	0.007282	0.016583	0.030323	0.003051	0.002171	0.008186	0.000820	0.002705

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0323	0.2762	0.1175	1.7600e-003		0.0223	0.0223		0.0223	0.0223		352.5453	352.5453	6.7600e-003	6.4600e-003	354.6908
NaturalGas Unmitigated	0.0323	0.2762	0.1175	1.7600e-003		0.0223	0.0223		0.0223	0.0223		352.5453	352.5453	6.7600e-003	6.4600e-003	354.6908

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	2319.98	0.0250	0.2138	0.0910	1.3600e-003		0.0173	0.0173		0.0173	0.0173		272.9383	272.9383	5.2300e-003	5.0000e-003	274.5994
Single Family Housing	676.66	7.3000e-003	0.0624	0.0265	4.0000e-004		5.0400e-003	5.0400e-003		5.0400e-003	5.0400e-003		79.6070	79.6070	1.5300e-003	1.4600e-003	80.0915
Total		**0.0323**	**0.2762**	**0.1175**	**1.7600e-003**		**0.0223**	**0.0223**		**0.0223**	**0.0223**		**352.5453**	**352.5453**	**6.7600e-003**	**6.4600e-003**	**354.6908**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	0.67666	7.3000e-003	0.0624	0.0265	4.0000e-004		5.0400e-003	5.0400e-003		5.0400e-003	5.0400e-003		79.6070	79.6070	1.5300e-003	1.4600e-003	80.0915
Single Family Housing	2.31998	0.0250	0.2138	0.0910	1.3600e-003		0.0173	0.0173		0.0173	0.0173		272.9383	272.9383	5.2300e-003	5.0000e-003	274.5994
Total		**0.0323**	**0.2762**	**0.1175**	**1.7600e-003**		**0.0223**	**0.0223**		**0.0223**	**0.0223**		**352.5453**	**352.5453**	**6.7600e-003**	**6.4600e-003**	**354.6908**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	95.2666	1.3172	119.4631	0.0458		16.4360	16.4360		16.4356	16.4356	1,721.8473	726.7228	2,448.5701	1.5935	0.1354	2,524.0197
Unmitigated	95.2666	1.3172	119.4631	0.0458		16.4360	16.4360		16.4356	16.4356	1,721.8473	726.7228	2,448.5701	1.5935	0.1354	2,524.0197

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0866					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.2161					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	94.8845	1.2873	116.8875	0.0457		16.4220	16.4220		16.4215	16.4215	1,721.8473	722.1177	2,443.9650	1.5890	0.1354	2,519.3188
Landscaping	0.0794	0.0299	2.5756	1.4000e-004		0.0141	0.0141		0.0141	0.0141		4.6051	4.6051	4.5600e-003		4.7010
Total	**95.2666**	**1.3172**	**119.4631**	**0.0458**		**16.4360**	**16.4360**		**16.4356**	**16.4356**	**1,721.8473**	**726.7228**	**2,448.5701**	**1.5935**	**0.1354**	**2,524.0197**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0866					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.2161					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	94.8845	1.2873	116.8875	0.0457		16.4220	16.4220		16.4215	16.4215	1,721.8473	722.1177	2,443.9650	1.5890	0.1354	2,519.3188
Landscaping	0.0794	0.0299	2.5756	1.4000e-004		0.0141	0.0141		0.0141	0.0141		4.6051	4.6051	4.5600e-003		4.7010
Total	**95.2666**	**1.3172**	**119.4631**	**0.0458**		**16.4360**	**16.4360**		**16.4356**	**16.4356**	**1,721.8473**	**726.7228**	**2,448.5701**	**1.5935**	**0.1354**	**2,524.0197**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

Carmel Rio Road

North Central Coast Air Basin, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Single Family Housing	7.00	Dwelling Unit	0.91	6,020.00	21
Single Family Housing	24.00	Dwelling Unit	6.99	4,080.00	73

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.8	**Precipitation Freq (Days)**	53
Climate Zone	4			**Operational Year**	2018
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - From project description

Construction Phase - Reflects 18-month construction schedule

Grading - From project plans

Vehicle Trips - From project traffic study

Table Name	Column Name	Default Value	New Value
tblAreaMitigation	UseLowVOCPaintNonresidentialExteriorValue	250	0
tblAreaMitigation	UseLowVOCPaintNonresidentialInteriorValue	250	0
tblAreaMitigation	UseLowVOCPaintResidentialExteriorValue	250	0
tblAreaMitigation	UseLowVOCPaintResidentialInteriorValue	250	0
tblConstructionPhase	NumDays	20.00	28.00
tblConstructionPhase	NumDays	230.00	285.00
tblConstructionPhase	NumDays	20.00	30.00
tblConstructionPhase	NumDays	20.00	30.00
tblConstructionPhase	PhaseEndDate	8/1/2018	6/30/2018
tblConstructionPhase	PhaseEndDate	3/24/2017	4/7/2017
tblConstructionPhase	PhaseStartDate	6/23/2018	5/23/2018
tblConstructionPhase	PhaseStartDate	2/11/2017	2/25/2017
tblGrading	AcresOfGrading	15.00	7.90
tblGrading	MaterialExported	0.00	199.00
tblGrading	MaterialImported	0.00	11,359.00
tblLandUse	LandUseSquareFeet	12,600.00	6,020.00
tblLandUse	LandUseSquareFeet	43,200.00	4,080.00
tblLandUse	LotAcreage	2.27	0.91
tblLandUse	LotAcreage	7.79	6.99
tblLandUse	Population	20.00	21.00
tblLandUse	Population	69.00	73.00
tblProjectCharacteristics	OperationalYear	2014	2018
tblTripsAndVMT	WorkerTripNumber	11.00	14.00
tblTripsAndVMT	WorkerTripNumber	2.00	3.00
tblVehicleTrips	ST_TR	10.08	9.52
tblVehicleTrips	WD_TR	9.57	9.52

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	6.7213	51.8793	43.4141	0.0670	18.2141	2.7556	20.9697	9.9699	2.5352	12.5051	0.0000	6,697.1241	6,697.1241	1.2361	0.0000	6,723.0813
2018	13.4887	23.5934	18.8830	0.0289	0.1479	1.4991	1.6339	0.0392	1.4092	1.4453	0.0000	2,783.7706	2,783.7706	0.7344	0.0000	2,799.1932
Total	**20.2100**	**75.4728**	**62.2971**	**0.0959**	**18.3620**	**4.2547**	**22.6036**	**10.0091**	**3.9444**	**13.9504**	**0.0000**	**9,480.8947**	**9,480.8947**	**1.9705**	**0.0000**	**9,522.2746**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	6.7181	51.8319	43.3908	0.0669	25.7911	2.7531	28.0001	9.9699	2.5328	12.5027	0.0000	6,694.3317	6,694.3317	1.2349	0.0000	6,720.2653
2018	13.4870	23.5721	18.8669	0.0289	0.1479	1.4977	1.6325	0.0392	1.4079	1.4441	0.0000	2,781.3762	2,781.3762	0.7337	0.0000	2,796.7848
Total	**20.2051**	**75.4039**	**62.2577**	**0.0958**	**25.9390**	**4.2508**	**29.6326**	**10.0091**	**3.9408**	**13.9468**	**0.0000**	**9,475.7078**	**9,475.7078**	**1.9687**	**0.0000**	**9,517.0501**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.0244**	**0.0912**	**0.0632**	**0.0626**	**-41.2646**	**0.0914**	**-31.0969**	**0.0000**	**0.0915**	**0.0259**	**0.0000**	**0.0547**	**0.0547**	**0.0908**	**0.0000**	**0.0549**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	95.2666	1.3172	119.4631	0.0458		16.4360	16.4360		16.4356	16.4356	1,721.8473	726.7228	2,448.5701	1.5935	0.1354	2,524.0197
Energy	0.0323	0.2762	0.1175	1.7600e-003		0.0223	0.0223		0.0223	0.0223		352.5453	352.5453	6.7600e-003	6.4600e-003	354.6908
Mobile	3.8670	3.5002	16.0312	0.0269	1.8037	0.0417	1.8454	0.4820	0.0384	0.5205		2,227.9748	2,227.9748	0.1083		2,230.2496
Total	**99.1659**	**5.0936**	**135.6118**	**0.0745**	**1.8037**	**16.5001**	**18.3038**	**0.4820**	**16.4963**	**16.9783**	**1,721.8473**	**3,307.2428**	**5,029.0901**	**1.7086**	**0.1419**	**5,108.9601**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	95.2666	1.3172	119.4631	0.0458		16.4360	16.4360		16.4356	16.4356	1,721.8473	726.7228	2,448.5701	1.5935	0.1354	2,524.0197
Energy	0.0323	0.2762	0.1175	1.7600e-003		0.0223	0.0223		0.0223	0.0223		352.5453	352.5453	6.7600e-003	6.4600e-003	354.6908
Mobile	3.8670	3.5002	16.0312	0.0269	1.8037	0.0417	1.8454	0.4820	0.0384	0.5205		2,227.9748	2,227.9748	0.1083		2,230.2496
Total	**99.1659**	**5.0936**	**135.6118**	**0.0745**	**1.8037**	**16.5001**	**18.3038**	**0.4820**	**16.4963**	**16.9783**	**1,721.8473**	**3,307.2428**	**5,029.0901**	**1.7086**	**0.1419**	**5,108.9601**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2017	1/27/2017	5	20	
2	Site Preparation	Site Preparation	1/28/2017	2/10/2017	5	10	
3	Grading	Grading	2/25/2017	4/7/2017	5	30	
4	Building Construction	Building Construction	4/8/2017	5/11/2018	5	285	
5	Paving	Paving	5/12/2018	6/22/2018	5	30	
6	Architectural Coating	Architectural Coating	5/23/2018	6/30/2018	5	28	

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Demolition	Excavators	3	8.00	162	0.38
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Grading	Excavators	1	8.00	162	0.38
Building Construction	Cranes	1	7.00	226	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Paving	Pavers	2	8.00	125	0.42
Paving	Rollers	2	8.00	80	0.38
Demolition	Rubber Tired Dozers	2	8.00	255	0.40
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Grading	Graders	1	8.00	174	0.41
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Paving	Paving Equipment	2	8.00	130	0.36
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Site Preparation	Rubber Tired Dozers	3	8.00	255	0.40
Building Construction	Welders	1	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	1,445.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	14.00	3.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	3.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2017

Unmitigated Construction On-Site

Acres of Grading: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	4.0482	42.6971	33.8934	0.0399		2.1252	2.1252		1.9797	1.9797		4,036.4674	4,036.4674	1.1073		4,059.7211
Total	**4.0482**	**42.6971**	**33.8934**	**0.0399**		**2.1252**	**2.1252**		**1.9797**	**1.9797**		**4,036.4674**	**4,036.4674**	**1.1073**		**4,059.7211**

3.2 Demolition - 2017

Unmitigated Construction Off-Site

Acres of Grading: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2690	0.1049	0.9037	1.4700e-003	0.1232	1.1600e-003	0.1244	0.0327	1.0700e-003	0.0338		118.2099	118.2099	7.9400e-003		118.3765
Total	**0.2690**	**0.1049**	**0.9037**	**1.4700e-003**	**0.1232**	**1.1600e-003**	**0.1244**	**0.0327**	**1.0700e-003**	**0.0338**		**118.2099**	**118.2099**	**7.9400e-003**		**118.3765**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	4.0445	42.6579	33.8623	0.0399		2.1233	2.1233		1.9779	1.9779	0.0000	4,032.7641	4,032.7641	1.1063		4,055.9965
Total	**4.0445**	**42.6579**	**33.8623**	**0.0399**		**2.1233**	**2.1233**		**1.9779**	**1.9779**	**0.0000**	**4,032.7641**	**4,032.7641**	**1.1063**		**4,055.9965**

3.2 Demolition - 2017

Mitigated Construction Off-Site

Acres of Grading: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2690	0.1049	0.9037	1.4700e-003	0.1232	1.1600e-003	0.1244	0.0327	1.0700e-003	0.0338		118.2099	118.2099	7.9400e-003		118.3765
Total	**0.2690**	**0.1049**	**0.9037**	**1.4700e-003**	**0.1232**	**1.1600e-003**	**0.1244**	**0.0327**	**1.0700e-003**	**0.0338**		**118.2099**	**118.2099**	**7.9400e-003**		**118.3765**

3.3 Site Preparation - 2017

Unmitigated Construction On-Site

Acres of Grading: 7.9

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Off-Road	4.8382	51.7535	39.3970	0.0391		2.7542	2.7542		2.5339	2.5339		4,003.0859	4,003.0859	1.2265		4,028.8432
Total	**4.8382**	**51.7535**	**39.3970**	**0.0391**	**18.0663**	**2.7542**	**20.8205**	**9.9307**	**2.5339**	**12.4646**		**4,003.0859**	**4,003.0859**	**1.2265**		**4,028.8432**

3.3 Site Preparation - 2017

Unmitigated Construction Off-Site

Acres of Grading: 7.9

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.3228	0.1259	1.0844	1.7700e-003	0.1479	1.4000e-003	0.1493	0.0392	1.2800e-003	0.0405		141.8519	141.8519	9.5200e-003		142.0518
Total	**0.3228**	**0.1259**	**1.0844**	**1.7700e-003**	**0.1479**	**1.4000e-003**	**0.1493**	**0.0392**	**1.2800e-003**	**0.0405**		**141.8519**	**141.8519**	**9.5200e-003**		**142.0518**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Off-Road	4.8338	51.7060	39.3609	0.0391		2.7517	2.7517		2.5316	2.5316	0.0000	3,999.4133	3,999.4133	1.2254		4,025.1470
Total	**4.8338**	**51.7060**	**39.3609**	**0.0391**	**18.0663**	**2.7517**	**20.8180**	**9.9307**	**2.5316**	**12.4622**	**0.0000**	**3,999.4133**	**3,999.4133**	**1.2254**		**4,025.1470**

3.3 Site Preparation - 2017

Mitigated Construction Off-Site

Acres of Grading: 7.9

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.3228	0.1259	1.0844	1.7700e-003	0.1479	1.4000e-003	0.1493	0.0392	1.2800e-003	0.0405		141.8519	141.8519	9.5200e-003		142.0518
Total	**0.3228**	**0.1259**	**1.0844**	**1.7700e-003**	**0.1479**	**1.4000e-003**	**0.1493**	**0.0392**	**1.2800e-003**	**0.0405**		**141.8519**	**141.8519**	**9.5200e-003**		**142.0518**

3.4 Grading - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.3610	0.0000	6.3610	3.3494	0.0000	3.3494			0.0000			0.0000
Off-Road	3.4555	35.9825	25.3812	0.0297		2.0388	2.0388		1.8757	1.8757		3,043.6667	3,043.6667	0.9326		3,063.2507
Total	**3.4555**	**35.9825**	**25.3812**	**0.0297**	**6.3610**	**2.0388**	**8.3998**	**3.3494**	**1.8757**	**5.2251**		**3,043.6667**	**3,043.6667**	**0.9326**		**3,063.2507**

3.4 Grading - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	2.9967	11.5414	17.1291	0.0358	0.8392	0.1709	1.0101	0.2298	0.1572	0.3870		3,535.2475	3,535.2475	0.0248		3,535.7689
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2690	0.1049	0.9037	1.4700e-003	0.1232	1.1600e-003	0.1244	0.0327	1.0700e-003	0.0338		118.2099	118.2099	7.9400e-003		118.3765
Total	**3.2657**	**11.6463**	**18.0328**	**0.0372**	**0.9625**	**0.1721**	**1.1345**	**0.2625**	**0.1583**	**0.4208**		**3,653.4574**	**3,653.4574**	**0.0328**		**3,654.1454**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.3610	0.0000	6.3610	3.3494	0.0000	3.3494			0.0000			0.0000
Off-Road	3.4524	35.9494	25.3579	0.0297		2.0369	2.0369		1.8740	1.8740	0.0000	3,040.8743	3,040.8743	0.9317		3,060.4404
Total	**3.4524**	**35.9494**	**25.3579**	**0.0297**	**6.3610**	**2.0369**	**8.3979**	**3.3494**	**1.8740**	**5.2234**	**0.0000**	**3,040.8743**	**3,040.8743**	**0.9317**		**3,060.4404**

3.4 Grading - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	2.9967	11.5414	17.1291	0.0358	19.3069	0.1709	19.4778	4.7628	0.1572	4.9200		3,535.2475	3,535.2475	0.0248		3,535.7689
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2690	0.1049	0.9037	1.4700e-003	0.1232	1.1600e-003	0.1244	0.0327	1.0700e-003	0.0338		118.2099	118.2099	7.9400e-003		118.3765
Total	**3.2657**	**11.6463**	**18.0328**	**0.0372**	**19.4302**	**0.1721**	**19.6022**	**4.7955**	**0.1583**	**4.9538**		**3,653.4574**	**3,653.4574**	**0.0328**		**3,654.1454**

3.5 Building Construction - 2017

Unmitigated Construction On-Site

Acres of Paving: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.1024	26.4057	18.1291	0.0268		1.7812	1.7812		1.6730	1.6730		2,639.8053	2,639.8053	0.6497		2,653.4490
Total	**3.1024**	**26.4057**	**18.1291**	**0.0268**		**1.7812**	**1.7812**		**1.6730**	**1.6730**		**2,639.8053**	**2,639.8053**	**0.6497**		**2,653.4490**

3.5 Building Construction - 2017

Unmitigated Construction Off-Site

Acres of Paving: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0783	0.2713	0.6324	7.0000e-004	0.0197	4.2600e-003	0.0240	5.6100e-003	3.9200e-003	9.5300e-003		68.7568	68.7568	5.6000e-004		68.7685
Worker	0.2511	0.0979	0.8434	1.3700e-003	0.1150	1.0900e-003	0.1161	0.0305	1.0000e-003	0.0315		110.3292	110.3292	7.4100e-003		110.4848
Total	**0.3294**	**0.3692**	**1.4759**	**2.0700e-003**	**0.1348**	**5.3500e-003**	**0.1401**	**0.0361**	**4.9200e-003**	**0.0410**		**179.0860**	**179.0860**	**7.9700e-003**		**179.2533**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.0995	26.3814	18.1125	0.0268		1.7796	1.7796		1.6714	1.6714	0.0000	2,637.3834	2,637.3834	0.6491		2,651.0146
Total	**3.0995**	**26.3814**	**18.1125**	**0.0268**		**1.7796**	**1.7796**		**1.6714**	**1.6714**	**0.0000**	**2,637.3834**	**2,637.3834**	**0.6491**		**2,651.0146**

3.5 Building Construction - 2017

Mitigated Construction Off-Site

Acres of Paving: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0783	0.2713	0.6324	7.0000e-004	0.0197	4.2600e-003	0.0240	5.6100e-003	3.9200e-003	9.5300e-003		68.7568	68.7568	5.6000e-004		68.7685
Worker	0.2511	0.0979	0.8434	1.3700e-003	0.1150	1.0900e-003	0.1161	0.0305	1.0000e-003	0.0315		110.3292	110.3292	7.4100e-003		110.4848
Total	**0.3294**	**0.3692**	**1.4759**	**2.0700e-003**	**0.1348**	**5.3500e-003**	**0.1401**	**0.0361**	**4.9200e-003**	**0.0410**		**179.0860**	**179.0860**	**7.9700e-003**		**179.2533**

3.5 Building Construction - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.6687	23.2608	17.5327	0.0268		1.4943	1.4943		1.4048	1.4048		2,609.9390	2,609.9390	0.6387		2,623.3517
Total	**2.6687**	**23.2608**	**17.5327**	**0.0268**		**1.4943**	**1.4943**		**1.4048**	**1.4048**		**2,609.9390**	**2,609.9390**	**0.6387**		**2,623.3517**

3.5 Building Construction - 2018

Unmitigated Construction Off-Site

Acres of Paving: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0729	0.2450	0.6067	7.0000e-004	0.0197	3.8000e-003	0.0235	5.6100e-003	3.4900e-003	9.1000e-003		67.5898	67.5898	5.3000e-004		67.6010
Worker	0.2278	0.0876	0.7436	1.3700e-003	0.1150	1.0300e-003	0.1160	0.0305	9.5000e-004	0.0315		106.2419	106.2419	6.7500e-003		106.3838
Total	**0.3007**	**0.3326**	**1.3504**	**2.0700e-003**	**0.1348**	**4.8300e-003**	**0.1396**	**0.0361**	**4.4400e-003**	**0.0406**		**173.8317**	**173.8317**	**7.2800e-003**		**173.9847**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.6662	23.2395	17.5166	0.0268		1.4929	1.4929		1.4035	1.4035	0.0000	2,607.5445	2,607.5445	0.6381		2,620.9449
Total	**2.6662**	**23.2395**	**17.5166**	**0.0268**		**1.4929**	**1.4929**		**1.4035**	**1.4035**	**0.0000**	**2,607.5445**	**2,607.5445**	**0.6381**		**2,620.9449**

3.5 Building Construction - 2018

Mitigated Construction Off-Site

Acres of Paving: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0729	0.2450	0.6067	7.0000e-004	0.0197	3.8000e-003	0.0235	5.6100e-003	3.4900e-003	9.1000e-003		67.5898	67.5898	5.3000e-004		67.6010
Worker	0.2278	0.0876	0.7436	1.3700e-003	0.1150	1.0300e-003	0.1160	0.0305	9.5000e-004	0.0315		106.2419	106.2419	6.7500e-003		106.3838
Total	**0.3007**	**0.3326**	**1.3504**	**2.0700e-003**	**0.1348**	**4.8300e-003**	**0.1396**	**0.0361**	**4.4400e-003**	**0.0406**		**173.8317**	**173.8317**	**7.2800e-003**		**173.9847**

3.6 Paving - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6114	17.1628	14.4944	0.0223		0.9386	0.9386		0.8635	0.8635		2,245.2695	2,245.2695	0.6990		2,259.9481
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.6114**	**17.1628**	**14.4944**	**0.0223**		**0.9386**	**0.9386**		**0.8635**	**0.8635**		**2,245.2695**	**2,245.2695**	**0.6990**		**2,259.9481**

3.6 Paving - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2441	0.0938	0.7967	1.4700e-003	0.1232	1.1100e-003	0.1243	0.0327	1.0200e-003	0.0337		113.8306	113.8306	7.2400e-003		113.9826
Total	**0.2441**	**0.0938**	**0.7967**	**1.4700e-003**	**0.1232**	**1.1100e-003**	**0.1243**	**0.0327**	**1.0200e-003**	**0.0337**		**113.8306**	**113.8306**	**7.2400e-003**		**113.9826**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6099	17.1470	14.4811	0.0223		0.9378	0.9378		0.8628	0.8628	0.0000	2,243.2096	2,243.2096	0.6983		2,257.8747
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.6099**	**17.1470**	**14.4811**	**0.0223**		**0.9378**	**0.9378**		**0.8628**	**0.8628**	**0.0000**	**2,243.2096**	**2,243.2096**	**0.6983**		**2,257.8747**

3.6 Paving - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2441	0.0938	0.7967	1.4700e-003	0.1232	1.1100e-003	0.1243	0.0327	1.0200e-003	0.0337		113.8306	113.8306	7.2400e-003		113.9826
Total	**0.2441**	**0.0938**	**0.7967**	**1.4700e-003**	**0.1232**	**1.1100e-003**	**0.1243**	**0.0327**	**1.0200e-003**	**0.0337**		**113.8306**	**113.8306**	**7.2400e-003**		**113.9826**

3.7 Architectural Coating - 2018

Unmitigated Construction On-Site

Residential Indoor: 20,453; Residential Outdoor: 6,818; Non-Residential Indoor: 0; Non-Residential Outdoor: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	11.2858					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2986	2.0058	1.8542	2.9700e-003		0.1506	0.1506		0.1506	0.1506		281.4485	281.4485	0.0267		282.0102
Total	**11.5844**	**2.0058**	**1.8542**	**2.9700e-003**		**0.1506**	**0.1506**		**0.1506**	**0.1506**		**281.4485**	**281.4485**	**0.0267**		**282.0102**

3.7 Architectural Coating - 2018

Unmitigated Construction Off-Site

Residential Indoor: 20,453; Residential Outdoor: 6,818; Non-Residential Indoor: 0; Non-Residential Outdoor: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0488	0.0188	0.1594	2.9000e-004	0.0246	2.2000e-004	0.0249	6.5400e-003	2.0000e-004	6.7400e-003		22.7661	22.7661	1.4500e-003		22.7965
Total	**0.0488**	**0.0188**	**0.1594**	**2.9000e-004**	**0.0246**	**2.2000e-004**	**0.0249**	**6.5400e-003**	**2.0000e-004**	**6.7400e-003**		**22.7661**	**22.7661**	**1.4500e-003**		**22.7965**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	11.2858					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2984	2.0039	1.8525	2.9700e-003		0.1504	0.1504		0.1504	0.1504	0.0000	281.1903	281.1903	0.0267		281.7514
Total	**11.5842**	**2.0039**	**1.8525**	**2.9700e-003**		**0.1504**	**0.1504**		**0.1504**	**0.1504**	**0.0000**	**281.1903**	**281.1903**	**0.0267**		**281.7514**

3.7 Architectural Coating - 2018

Mitigated Construction Off-Site

Residential Indoor: 20,453; Residential Outdoor: 6,818; Non-Residential Indoor: 0; Non-Residential Outdoor: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0488	0.0188	0.1594	2.9000e-004	0.0246	2.2000e-004	0.0249	6.5400e-003	2.0000e-004	6.7400e-003		22.7661	22.7661	1.4500e-003		22.7965
Total	**0.0488**	**0.0188**	**0.1594**	**2.9000e-004**	**0.0246**	**2.2000e-004**	**0.0249**	**6.5400e-003**	**2.0000e-004**	**6.7400e-003**		**22.7661**	**22.7661**	**1.4500e-003**		**22.7965**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	3.8670	3.5002	16.0312	0.0269	1.8037	0.0417	1.8454	0.4820	0.0384	0.5205		2,227.9748	2,227.9748	0.1083		2,230.2496
Unmitigated	3.8670	3.5002	16.0312	0.0269	1.8037	0.0417	1.8454	0.4820	0.0384	0.5205		2,227.9748	2,227.9748	0.1083		2,230.2496

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Single Family Housing	66.64	66.64	61.39	189,822	189,822
Single Family Housing	228.48	228.48	210.48	650,818	650,818
Total	295.12	295.12	271.87	840,639	840,639

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Single Family Housing	10.80	7.30	7.50	44.00	18.80	37.20	86	11	3
Single Family Housing	10.80	7.30	7.50	44.00	18.80	37.20	86	11	3

4.4 Fleet Mix

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.463934	0.038758	0.210530	0.164352	0.051306	0.007282	0.016583	0.030323	0.003051	0.002171	0.008186	0.000820	0.002705

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0323	0.2762	0.1175	1.7600e-003		0.0223	0.0223		0.0223	0.0223		352.5453	352.5453	6.7600e-003	6.4600e-003	354.6908
NaturalGas Unmitigated	0.0323	0.2762	0.1175	1.7600e-003		0.0223	0.0223		0.0223	0.0223		352.5453	352.5453	6.7600e-003	6.4600e-003	354.6908

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	2319.98	0.0250	0.2138	0.0910	1.3600e-003		0.0173	0.0173		0.0173	0.0173		272.9383	272.9383	5.2300e-003	5.0000e-003	274.5994
Single Family Housing	676.66	7.3000e-003	0.0624	0.0265	4.0000e-004		5.0400e-003	5.0400e-003		5.0400e-003	5.0400e-003		79.6070	79.6070	1.5300e-003	1.4600e-003	80.0915
Total		**0.0323**	**0.2762**	**0.1175**	**1.7600e-003**		**0.0223**	**0.0223**		**0.0223**	**0.0223**		**352.5453**	**352.5453**	**6.7600e-003**	**6.4600e-003**	**354.6908**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	2.31998	0.0250	0.2138	0.0910	1.3600e-003		0.0173	0.0173		0.0173	0.0173		272.9383	272.9383	5.2300e-003	5.0000e-003	274.5994
Single Family Housing	0.67666	7.3000e-003	0.0624	0.0265	4.0000e-004		5.0400e-003	5.0400e-003		5.0400e-003	5.0400e-003		79.6070	79.6070	1.5300e-003	1.4600e-003	80.0915
Total		**0.0323**	**0.2762**	**0.1175**	**1.7600e-003**		**0.0223**	**0.0223**		**0.0223**	**0.0223**		**352.5453**	**352.5453**	**6.7600e-003**	**6.4600e-003**	**354.6908**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	95.2666	1.3172	119.4631	0.0458		16.4360	16.4360		16.4356	16.4356	1,721.8473	726.7228	2,448.5701	1.5935	0.1354	2,524.0197
Unmitigated	95.2666	1.3172	119.4631	0.0458		16.4360	16.4360		16.4356	16.4356	1,721.8473	726.7228	2,448.5701	1.5935	0.1354	2,524.0197

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0866					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.2161					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	94.8845	1.2873	116.8875	0.0457		16.4220	16.4220		16.4215	16.4215	1,721.8473	722.1177	2,443.9650	1.5890	0.1354	2,519.3188
Landscaping	0.0794	0.0299	2.5756	1.4000e-004		0.0141	0.0141		0.0141	0.0141		4.6051	4.6051	4.5600e-003		4.7010
Total	**95.2666**	**1.3172**	**119.4631**	**0.0458**		**16.4360**	**16.4360**		**16.4356**	**16.4356**	**1,721.8473**	**726.7228**	**2,448.5701**	**1.5935**	**0.1354**	**2,524.0197**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0866					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.2161					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	94.8845	1.2873	116.8875	0.0457		16.4220	16.4220		16.4215	16.4215	1,721.8473	722.1177	2,443.9650	1.5890	0.1354	2,519.3188
Landscaping	0.0794	0.0299	2.5756	1.4000e-004		0.0141	0.0141		0.0141	0.0141		4.6051	4.6051	4.5600e-003		4.7010
Total	**95.2666**	**1.3172**	**119.4631**	**0.0458**		**16.4360**	**16.4360**		**16.4356**	**16.4356**	**1,721.8473**	**726.7228**	**2,448.5701**	**1.5935**	**0.1354**	**2,524.0197**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

Appendix C-2

MBARD Consistency Procedure

MBUAPCD CONSISTENCY DETERMINATION PROCEDURE Ver. 4.0

row

Data entry — *Data entered by user.*

Consistency Finding — NO / YES

row					
6	Jurisdiction:	**County of Monterey Unincorp**			*Lead Agency selects from pull down*
7	Project Name:	**Carmel Rio Road**			*Lead Agency enters*
8	Base Year for this determination:	**2010**	Project Buildout/ Occupancy Year	**2020**	*Lead Agency enters*
9			Proposed Project Occupied DU		*Total buildout of Project. Sum of all years, row 26.*

JURISDICTION DATA FROM AQMP & DOF (no data entry)

row		Base Year	Period ending January 1st of:					
		2010	**2015**	**2020**	**2025**	**2030**	**2035**	***Notes***
14	DOF Population	109,607	*From Calif. Dept of Finance. Est. for Jan 1 -- released in June of each year.*					
15	AMBAG DU Forecast for Jurisdiction	42,506	44,442	45,406	46,668	47,139	48,688	*DUs from AMBAG Travel Model, current version.*
16	AMBAG Pop Forecast for Jurisdiction	109,509	111,105	113,778	114,469	113,628	114,052	*Latest AMBAG Pop. & Employment forecasts.*
17	AMBAG Forecast Population/ DU	2.58	2.50	2.51	2.45	2.41	2.34	*Row 16/ row 15*
18	Estimated Built DUs	38,874	*Entry for 2010 is the DOF 1/2010 Housing Unit Estimate. Lead agency may overwrite if they have better data.*					

JURISDICTION DUs w/o PROJECT

row		**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	
21	Housing Stock (Built DUs, Total)	40,258	38,874	38,874	38,874	38,874	38,874	*2010 Housing Stock is baseline across the project life; 38,874 existing DUs (2016)*
22	Approved but not Built DUs	0	99	99	99	99	99	*Lead Agency estimates value at period end.*
23	Total Built & Approved DUs	40,258	38,973	38,973	38,973	38,973	38,973	*Sum of Row 21 + 22*

PROPOSED NEW PROJECT DUs

row		**2015**	**2020**	**2025**	**2030**	**2035**	
26	Proposed New Project DUs		**31**	**31**	**31**	**31**	*Data entry by Lead Agency.*
27	TOTAL, New Project + Built & Approved DUs	**38,973**	**39,004**	**39,004**	**39,004**	**39,004**	*Sum of Row 23 + 26*

NEW PROJECT CONSISTENCY DETERMINATION

row		**2015**	**2020**	**2025**	**2030**	**2035**	
29	Over (Under) AQMP DUs	**(5,469)**	**(6,402)**	**(7,664)**	**(8,135)**	**(9,684)**	*Row 27 - Row 15*
30	Is the project consistent in this Period?	**YES**	**YES**	**YES**	**YES**	**YES**	*If Row 30 is (negative) = YES, if positive = NO.*

OPTIONS IF INCONSISTENT (Choose one):

row	Year:	**2015**	**2020**	**2025**	**2030**	**2035**	
38	**A. Consult CEQA Statute and Guidelines for appropriate mitigation options**						
	B. Lead Agency preparation of consistency determination via an alternative method						
40	**C. Regional offset of significant cumulative air quality impact; For EIRs, declare Statement of Overriding Consideration**						

Appendix D

Biological Reports

Appendix D-1

Biological Assessment

Biological Assessment for Val Verde Property

Val Verde Drive, Carmel

Prepared for

Carmel Rio Road, LLC
8530 El Camino Estrada
Carmel, CA 93923

Prepared by

RanaCreekHabitatRestoration

May 29, 2007

Rana Creek Habitat Restoration
35351 East Carmel Valley Road, Carmel Valley, California 93924 Tele.(831) 659 - 3820 Fax.(831) 659 – 4851

SUMMARY 3

INTRODUCTION 3
Property Location 3
Project Description 3

METHODS 3

RESULTS 4
Habitat Types 4
Special-Status Species 6

DISCUSSION 9

IMPACTS AND MITIGATION MEASURES 9

REFERENCES 11

Map 1. Location of Val Verde Property in Carmel, Ca. 12
Map 2. Habitat types on Val Verde property 13
Map 3. CNDDB plant records within 1.25 miles of Val Verde project site 14
Map 4. CNDDB animal records within 1.25 miles of the Val Verde project site. 15

APPENDIX 1. Plant species observed at Val Verde site May 23, 2007 16
APPENDIX 2. Animal species detected at Val Verde site May 23, 2007. 17

Owner/Applicant

Carmel Rio Road, LLC
8530 El Camino Estrada
Carmel, CA 93923

Principal Investigators

Rana Creek Habitat Restoration
35351 E. Carmel Valley Rd.
Carmel Valley, CA 93924
(831) 659-3820

APNs: 015-021-015, -020 & -021

SUMMARY

Carmel Rio Road, LLC proposes to construct residential housing on property off of Val Verde Drive in Carmel, California. The property was assessed for potential habitat for sensitive plant and animal species. No protected plant species were observed. Monterey dusky-footed woodrat nests were observed at the project site, which also provides potential nesting and foraging habitat for white-tailed kites, potential winter roosting habitat for monarch butterflies and potential temporary dispersal habitat for California red-legged frogs. Mitigation measures will decrease adverse impacts to sensitive species and the project is expected to have minimal impacts to sensitive species.

INTRODUCTION

Property Location

The project site is located in Carmel, California and lies east of Highway 1 and south of Carmel Valley Road (Map. 1). The property is bounded to the east by Val Verde Drive, to the south by residential property and to the west by office buildings and covers approximately 7.9 acres. The Carmel River lies approximately 250 yards to the south. There is currently one residential house and small barn on the property. Nearby land uses include residential housing and shopping developments, fallow agricultural land, a golf course (Rancho Canada Golf Course) and riparian habitat associated with the Carmel River.

Project Description

The proposed project consists of constructing 31 single family and 11 inclusionary units with associated infrastructure including paved roads and carports.

METHODS

Prior to conducting the field portion of the assessment, the California Department of Fish and Game's *California Natural Diversity Data Base* (CNDDB) was queried to determine the special-status species that have been documented on and near the project site. Additional data regarding the potential occurrence of special-status species were gathered from the following sources: *The Status of Rare, Threatened, and Endangered Plants and Animals of California 2000-2004* (CDFG 2005), *Inventory of Rare and Endangered Plants* (CNPS 2005) and *An Illustrated Field Key to the Flowering Plants of Monterey*

County (Matthews 1997). Soil types were determined using the Natural Resource Conservation Service's *Web Soil Survey* (NRCS 2007).

On May 23, 2007, Sarah Millus of Rana Creek Environmental Planning conducted the field portion of the assessment. The assessment included:

- recording all plant and animal species detected on the site;
- classifying and mapping habitats present on-site;
- searching for animal signs (e.g., nests, tracks);
- examining burrows and any other special habitat features; and
- taking representative photographs of the site.

RESULTS

Habitat Types

Map 2 shows the habitat types found on the Val Verde property.

Fallow agriculture

The majority of the proposed project site is covered by fallow agricultural land (Fig. 1). Dominant species include field mustard (*Brassica rapa*) and dwarf nettle (*Uritca urens*).

Fig. 1. Fallow agricultural field on northern end of Val Verde property, May 23, 2007.

Mixed woodland

A strip of wooded habitat approximately 15 yards in width runs around the residence and along the southern border of the project site. Species in this area include Monterey cypress (*Cupressus macrocarpa*), Monterey pine (*Pinus radiata*), myoporum (*Myoporum laetum*) and holly-leafed cherry (*Prunus ilicifolia*). Monterey cypress and Monterey pine are not listed species and are therefore not protected by the California Department of Fish and Game, but they are on the California Native Plant Society (CNPS) 1B List, meaning that CNPS considers them "rare or endangered in California and elsewhere." These trees most likely were planted and were not part of the natural historical range for these species. Several Monterey dusky-footed woodrat nests were observed in this habitat.

Fig. 2 Woodland habitat on Val Verde property, May 23, 2007.

Residential

The southeast corner of the property contains a single house and a small storage shed. The vegetation in this area is mostly ornamental landscaping plants, including iceplant (*Carpobrotus edulis*) and cape ivy (*Senecio mikanioides*).

Soils

There are two soil types on the project site, Pico fine sandy loam and Metz fine sandy loam. The majority of the site is covered by Pico fine sandy loam, and only approximately 0.2 acres in the southwest corner of the project site is covered by Metz fine sandy loam (NRCS 2007). Descriptions below are from NRCS 2007.

Pico fine sandy loam
Deep, well drained soils that formed in alluvium from mostly sedimentary rocks. Pico soils are on floodplains and alluvial fans and have slopes of 0 to 9 percent. Pico soils are used primarily for growing row crops, citrus, grain, and pasture, and there is increasing urban use. Vegetation is annual grasses and forbs in uncultivated areas.

Metz fine sandy loam
Very deep, somewhat excessively drained soils that formed in alluvial material from mixed, but dominantly sedimentary rocks. Metz soils are on floodplains and alluvial fans and have slopes of 0 to 15 percent at elevations of 25 to 2,500 feet. Somewhat excessively drained; negligible to low runoff; moderately rapid permeability. Much of this soil is irrigated and used for growing pasture, hay, truck crops, field crops and fruit. Some areas are grazed and in willows, annual grasses and forbs.

Special-Status Species
In the sections below we list the special-status species that have the potential to occur at the project site. For each species we list the level of legal protection provided and discuss the species' potential to occur on the site.

PLANTS

A list of special status plant species known to occur within the vicinity of the Val Verde property is provided in Table 1 below. Monterey pine and Monterey cypress, both on the CNPS 1B list, were observed during the site visit. A list of all plant species observed is provided in Appendix 1.

Table 1.

Common Name *Scientific Name*	**Status**	**Potential habitat types**	**Potential to occur at site**
Plants			
Eastwood's goldenbush *Ericameria fasciculate*	CNPS 1B	sandy openings in closed-cone coniferous forest, maritime chaparral, coastal scrub, coastal dunes. 30-275m.	No habitat at site.
Gowen cypress *Cupressus goveniana* ssp. *goveniana*	FT, CNPS 1B	usually in sandy soils in closed-cone coniferous forest and coastal terraces. 100-125m.	Potential habitat at site.
Hickman's onion *Allium hickmanii*	CNPS 1B	sandy loam, damp ground and vernal swales in closed-cone coniferous forest, chaparral, coastal scrub, valley and foothill grassland, coastal prairie. 20-200m	Potential habitat at site.
Hooker's manzanita *Arctostaphylos hookeri* ssp. *hookeri*	CNPS 1B	sandy soils, sandy shales and sandstone outcrops in chaparral, coastal scrub, closed-cone coniferous forest and cismontane woodland. 85-300m.	No habitat at site.
Jolon clarkia *Clarkia jolonensis*	CNPS 1B	cismontane woodland. <500m.	No habitat at site.

Common Name *Scientific Name*	Status	Potential habitat types	Potential to occur at site
Kellogg's horkelia *Horkelia cuneata* ssp. *sericea*	CNPS 1B	openings in dunes, coastal sand hills, closed-cone coniferous forest, coastal scrub, chaparral. 10-200m.	No habitat at site.
marsh microseris *Microseris paludosa*	CNPS 1B	closed-cone coniferous forest, cismontane woodland, coastal scrub, valley and foothill grassland. 5-300m.	No habitat at site.
Monterey cypress *Cupressus macrocarpa*	CNPS 1B	granitic soils in closed-cone coniferous forest. 10-30m.	Present at site.
Monterey pine *Pinus radiata*	CNPS 1B	dry bluffs and slopes in closed-cone coniferous forest, cismontane woodland. 25-185m.	Present at site.
sandmat manzanita *Arctostaphylos pumila*	CNPS 1B	on sandy soil in closed-cone coniferous forest, chaparral, cismontane woodland, coastal dunes and coastal scrub. 3-205m.	No habitat at site.
Santa Lucia bush mallow *Malacothamnus palmeri* var. *palmeri*	CNPS 1B	talus hilltops and slopes, sometimes on serpentine soil in cismontane woodland, chaparral. 30-1100m.	No habitat at site.
Yadon's rein orchid *Piperia yadonii*	FE, CNPS 1B	on poorly drained and often dry sandstone and sandy soil in closed-cone coniferous forest, chaparral, coastal bluff scrub. 10-415m.	No habitat at site.
Natural Community	—		
Monterey Cypress Forest	—		
Monterey Pine Forest	—		
Monterey Pygmy Cypress Forest	—		
Northern Bishop Pine Forest	—		

Conservation Status Codes:
FE: Federally Endangered
FT: Federally Threatened
CE: Listed as Endangered in California.
CT: Listed as Threatened in California
CR: Listed as Rare in California
SC: CDFG listed Special Concern
CNPS 1A, 2, etc.: California Native Plant Society rare, threatened, endangered list classification:
1A. Presumed extinct in California
1B. Rare or Endangered in California and elsewhere
2. Rare or Endangered I California, more common elsewhere
3. Plants for which we need more information – Review list
4. Plants of limited distribution – Watch I

INVERTEBRATES

monarch butterfly (*Danaus plexippus*) (Lepidoptera)

No current list status; California Special Animal. Monarchs overwinter along the California coast from October through March. They require roosting areas in tall trees, usually eucalyptus, Monterey pines or Monterey cypress which provide protection from wind. They also require that sites be near sources of water and nectar. The tall cypress and pine trees present of the project site may provide winter roosting habitat for monarch butterflies.

Smith's blue butterfly *(Euphilotes enoptes smithi)*
Federally endangered. Found in association with coast buckwheat (*Eriogonum latifolium*) and seacliff buckwheat (*E. parvifolium*). Adult emergence and seasonal activity is synchronized with the blooming period of the buckwheat at a given site. Individual adult males and females live approximately one week, and both sexes spend the majority of their time on *Eriogonum* flowerheads. Females lay single eggs on the buckwheat flowers. There is no buckwheat present at the project site, and so it does not provide habitat for Smith's blue butterfly.

AMPHIBIANS

California red-legged frog (*Rana aurora draytonii*)
Federally Threatened species and a California Species of Special Concern. California red-legged frogs (CRLF) are found in freshwater aquatic habitats including streams, shallow ponds and drainages usually associated with riparian vegetation. Breeding occurs from November through April. Adult CRLF may disperse from breeding sites at any time of year and use a variety of upland habitat, moving through the landscape regardless of vegetation or topography. Upland habitat is used by dispersing frogs and to escape desiccation during the summer months and includes anything that provides shade and moisture, such as rocks, downed wood, moist leaf litter and small mammal burrows. There is one record for CRLF approximately 0.3 miles from the project site (CNDDB 2007). The project site may provide dispersal habitat for CRLF. Frogs are mostly likely to be found in the wooded areas on the project site. Little cover for frogs, such as small mammal burrows or leaf litter, was observed in the other habitats on site, and frogs are less likely to be present in these areas.

FISH

steelhead (*Oncorhynchus mykiss irideus*)
The central California coastal population of steelhead is Federally listed as Threatened. Steelhead are anadromous fish that come to streams in the spring to spawn in cool or cold waters with a gravel bottom, and clear and swift running water. Steelhead are known to occur in the Carmel River, 0.25 miles from the project site. Existing residential housing is present between the project site and the Carmel River. The project is not expected to impact steelhead.

BIRDS

white-tailed (=black-shouldered) kite (*Elanus leucurus*)
White-tailed kite is a California Fully Protected Species. White-tailed kites breed in lowland grasslands, wetlands, oak-woodland and savannah habitats, and riparian areas associated with open areas (Moore 2000). Habitats which support larger rodent prey populations are more suitable. Summer habitat preferences include riparian zones and dry pastures. Nests are built in trees, either in single isolated trees or those within large stands. Egg laying begins in February and peaks in March and April, and fledging is complete by October. Kites are non-migratory and winter habitat is similar to breeding

habitat, but without the need for nest trees. Riparian corridors represent a preferred landscape characteristic for kites in both the breeding and non-breeding season. White-tailed kites have been observed foraging in the open fields near the project site (P. Regan, Rana Creek, pers. obs.). The tall pine and cypress trees on the project site provide potential nesting habitat for kites and the fallow agriculture field provides potential foraging habitat.

MAMMALS

Monterey dusky-footed woodrat (*Neotoma fuscipes luciana*)

Fig. 3. Monterey dusky-footed woodrat nest observed in woodland habitat May 23, 2007.

The Monterey dusky-footed woodrat is a California Species of Special Concern. These woodrats are found close to water in areas of dense overgrowth such as willows and live oak and tend to avoid open grasslands or oak woodlands with small amounts of underbrush. Woodrats build multi-chamber houses on the ground, usually next to trees, out of dead wood, leaves and grass. Within suitable habitats, woodrats live in small colonies of three to fifteen or more nests. Availability of building materials may limit woodrat populations. Woodrats are primarily herbivorous, eating plant material including leaves, flowers and acorns. The reproductive period of this species usually extends from December to September, but individuals can be reproductively active year-round. Most females are reproductively active in April and May. Several Monterey dusky-footed woodrat nests were observed in the wooded areas of the project site (Fig. 3). Measures that will avoid adverse impacts to woodrats are outlined in the impacts and mitigation measures section below.

DISCUSSION

The majority of the project site is covered by non-native plant species and provides little habitat for sensitive species. The woodland area on the project site provides the highest quality habitat for sensitive species. Monterey dusky-footed woodrats were the only sensitive species observed on the project site in these wooded areas, and the tall trees here provide potential nesting habitat for white-tailed kites and other bird species.

IMPACTS AND MITIGATION MEASURES

1. **Impact**: Monterey dusky-footed woodrats present on site may be harmed by construction activities.

Mitigation: Construction activities will ideally occur when woodrats are least likely to be reproducing, October through November. A pre-construction survey for woodrat nests will be conducted by a qualified biologist prior to the onset of construction activities. All woodrat nests located during the survey will be flagged and a 25 ft buffer area established around each nest or group of nests. If nests cannot be avoided and must be removed to allow construction activities, nest(s) will be dismantled by hand prior to grading or vegetation removal activities. Dismantling of nests will be monitored by a qualified biologist. If young are encountered during nest dismantling, the dismantling activity will be stopped and the material carefully replaced back on the nest. Construction activities within 25 feet of nests with young will be stopped. These nests will be rechecked in 2-3 weeks to determine development of the young. Once the young are determined to be capable of being independent, nest dismantling can continue.

2. **Impact**: The project site provides potential nesting and foraging habitat for white-tailed kites, a California Fully Protected Species. This species, as well as other bird species protected under the Migratory Bird Treaty Act and the California Fish and Game Code, potentially nesting at the project site, may be disturbed by construction activities.

   Mitigation: A qualified biologist will conduct nest surveys on the site prior to construction or site preparation activities occurring during the nesting season of white-tailed kites (February through October). The survey shall be conducted no more than 14 days prior to commencement of construction activities. If active nests of white-tailed kite (or other species protected under the Migratory Bird Treaty Act and the California Fish and Game Code) are present in the construction zone, a temporary fence shall be erected 200 feet (or less if determined appropriate by the biologist) around the nest site. Upon recommendation of the biologist, clearing and construction within the fenced area shall be postponed or halted until juveniles have fledged and there is no evidence of a second nesting attempt. The biologist shall serve as a construction monitor during those periods when construction activities will occur near active nest areas to ensure that no inadvertent impacts to these nests will occur.

3. **Impact**: Overwintering monarch butterflies may be harmed or disturbed by construction activities.

   Mitigation: If construction activities occur during times when monarchs may be present (October through March), all tall trees should be inspected for the presence of monarchs by a qualified biologist prior to work being done around them. If monarchs are present, work associated with those specific trees being used by monarchs should be delayed until the monarchs are no longer present.

4. **Impact**: California red-legged frog that may be temporarily using the project site during dispersal activities may be harassed or harmed by construction activities.

Mitigation: No vegetation removal or grading will take place while it is raining. Precautions will also be taken to prevent puddling on site that may attract frogs. If initial ground disturbance occurs between October 15 and May 31, a pre-construction/grading survey of the entire area proposed for grading/construction activities shall be conducted for red-legged frogs by a qualified biologist. The survey shall conducted no earlier than 14 days prior to the commencement of construction-related activities. If red-legged frogs are observed, grading/ construction activities shall be postponed and the U.S. Fish and Wildlife Service shall be consulted to identify measures to minimize to potential of take to occur.

REFERENCES

[CDFG] California Department of Fish and Game. 2005. The Status of Rare, Threatened, and Endangered Plants and Animals of California 2000-2004. Habitat Conservation Planning Branch. http://www.dfg.ca.gov/hcpb/species/t_e_spp/ann_te_rpt.shtml. Accessed Feb. 2007.

[CNDDB] California Natural Diversity Database. 2007. California Natural Diversity Database website. http://www.dfg.ca.gov/whdab/html/cnddb.html. Accessed May 2007.

[CNPS] California Native Plant Society. 2005. Inventory of Rare and Endangered Plants (online edition, v6-05d). <http://www.cnps.org/inventory>. Accessed May 2007.

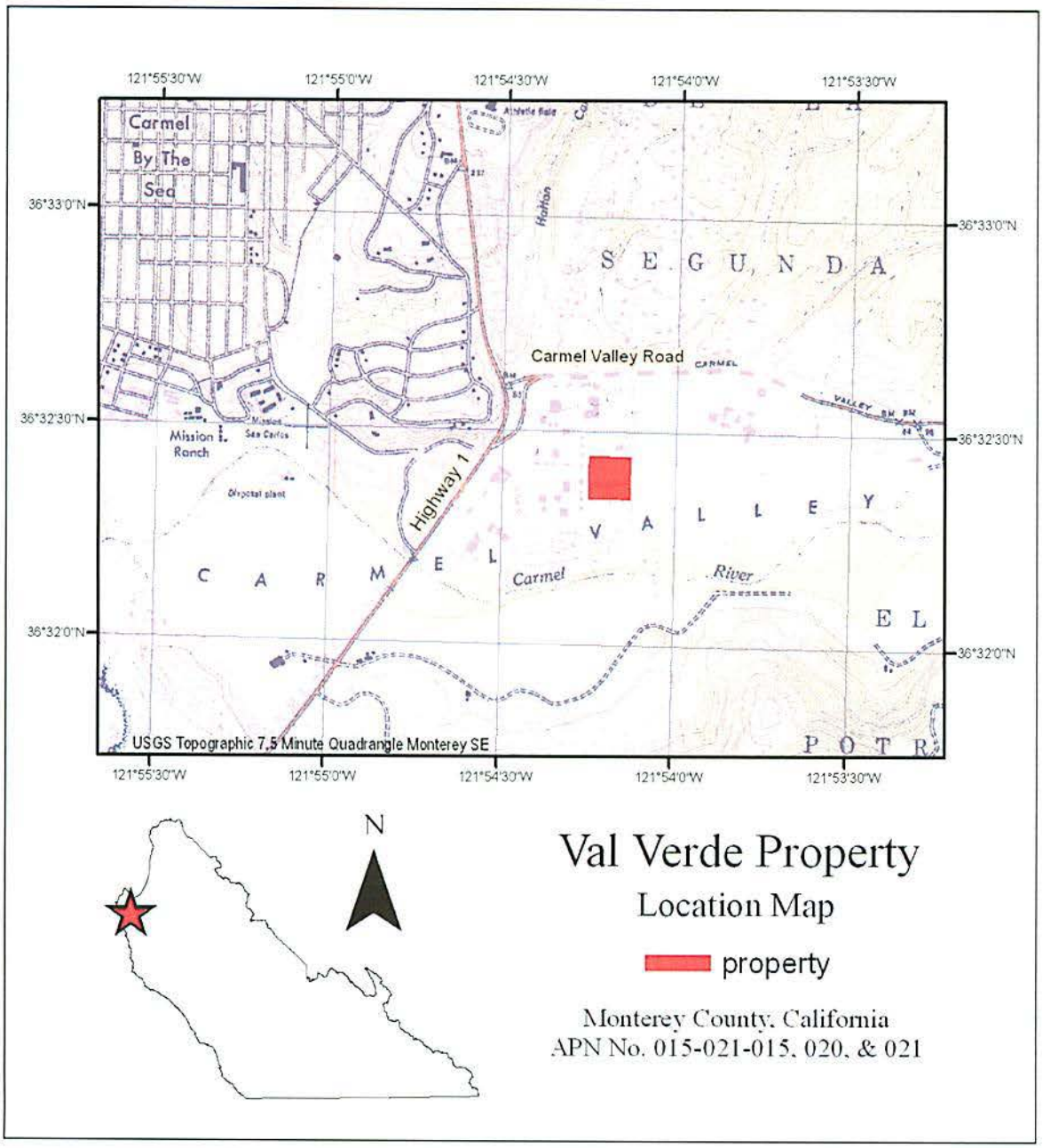
[NRCS] Natural Resource Conservation Service. 2007. Web Soil Survey. <http://websoilsurvey.nrcs.usda.gov/app/>. Accessed on May 2007.

CalFlora. 2007. The CalFlora Database: Information on California Plants for Education, Research and Conservation. <http://www.calflora.org/>. Accessed on Feb. 2007.

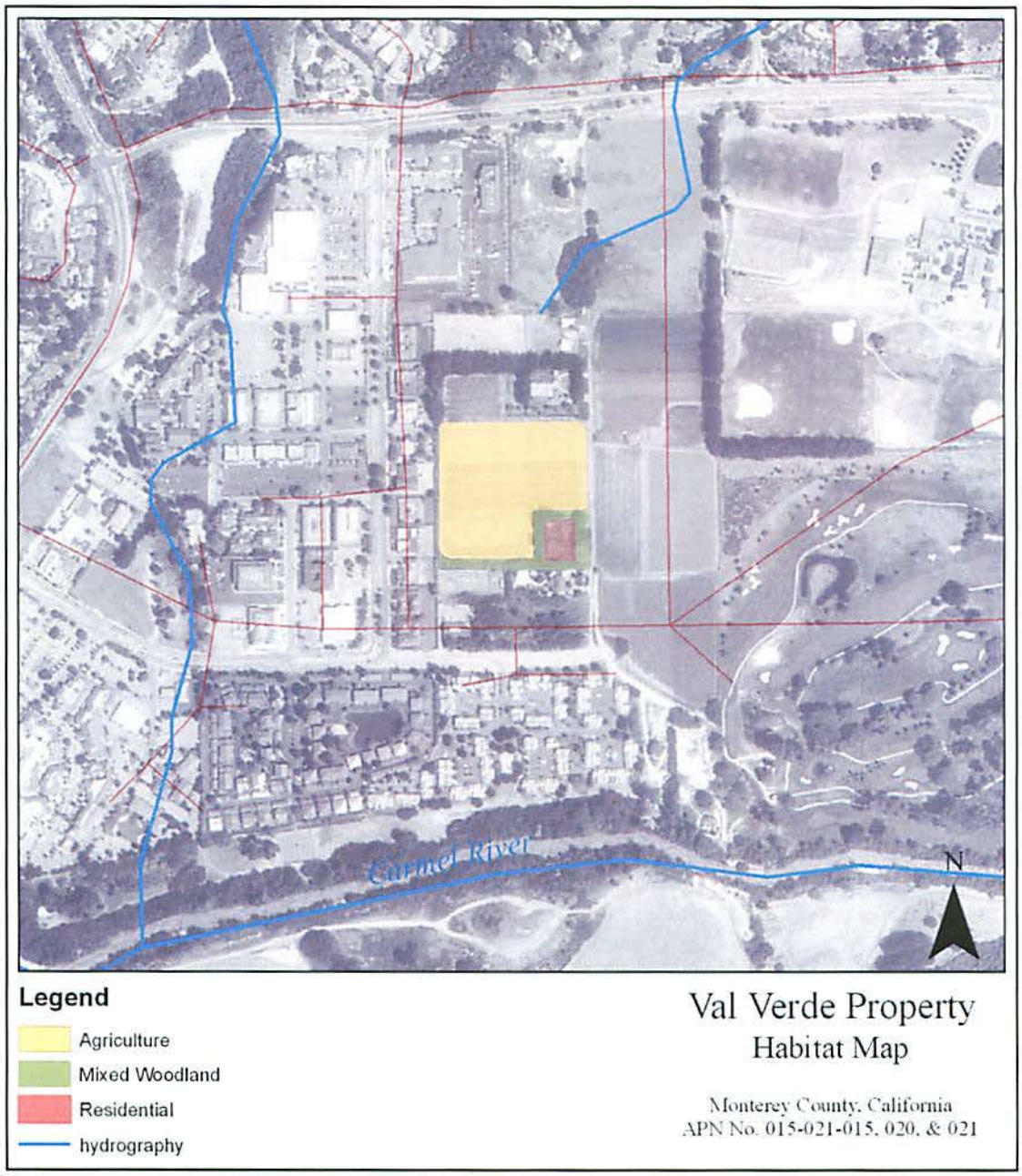
Mathews, M. A. and The California Native Plant Society. 1997. *The Illustrated Field Key to the Flowering Plants of Monterey County.*

Moore, J. 2000. White-tailed Kite (*Elanus leucurus*). Point Reyes Bird Observatory, Partners in Flight website. http://www.prbo.org/calpif/htmldocs/species/grassland/wtkiacct.html. Accessed December. 2006.

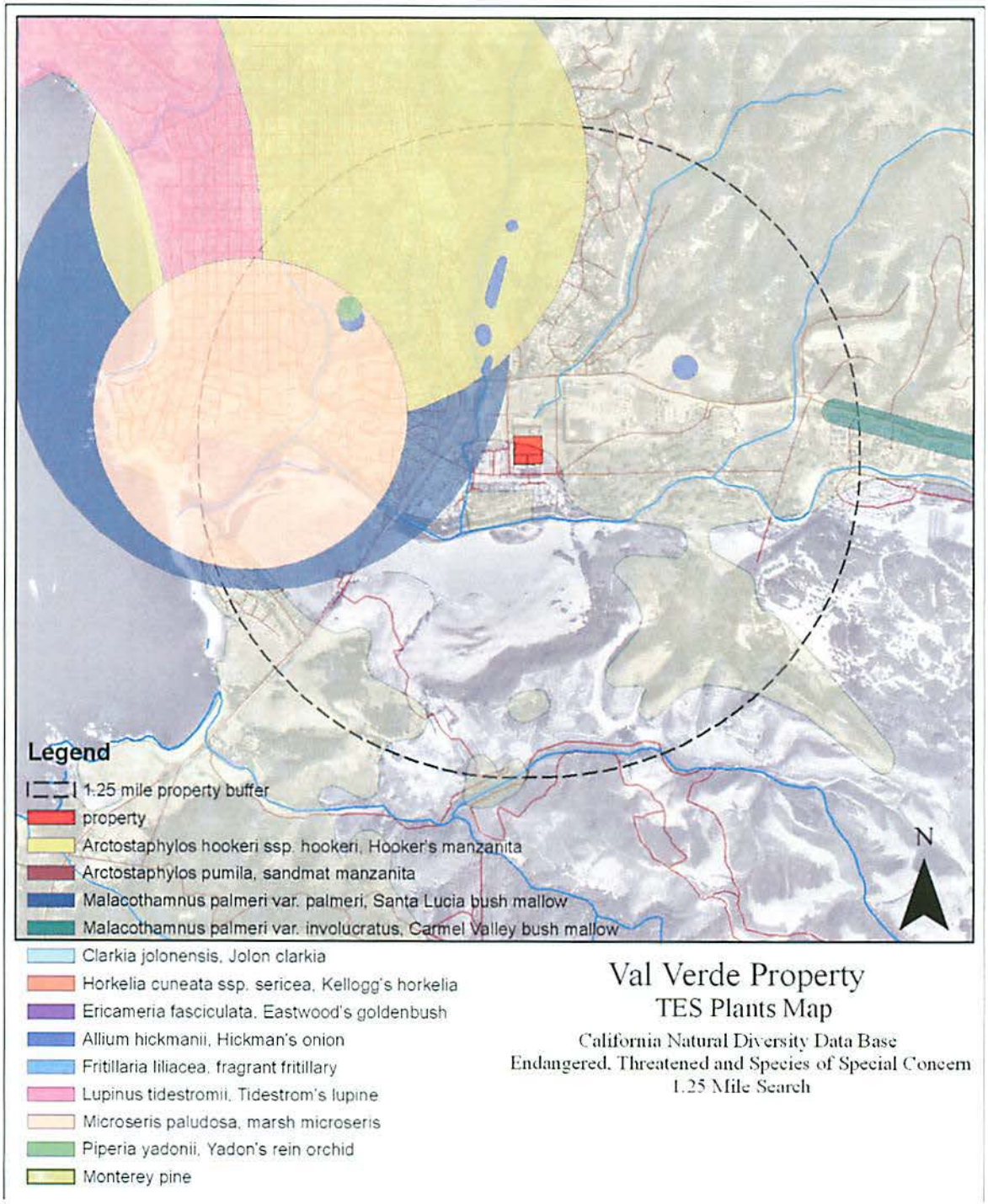
Remsen, J. V. 1978. Bird Species of Special Concern in California: An Annotated List of Declining or Vulnerable Bird Species. Sacramento, CA: California Department of Fish and Game. 54 pp.



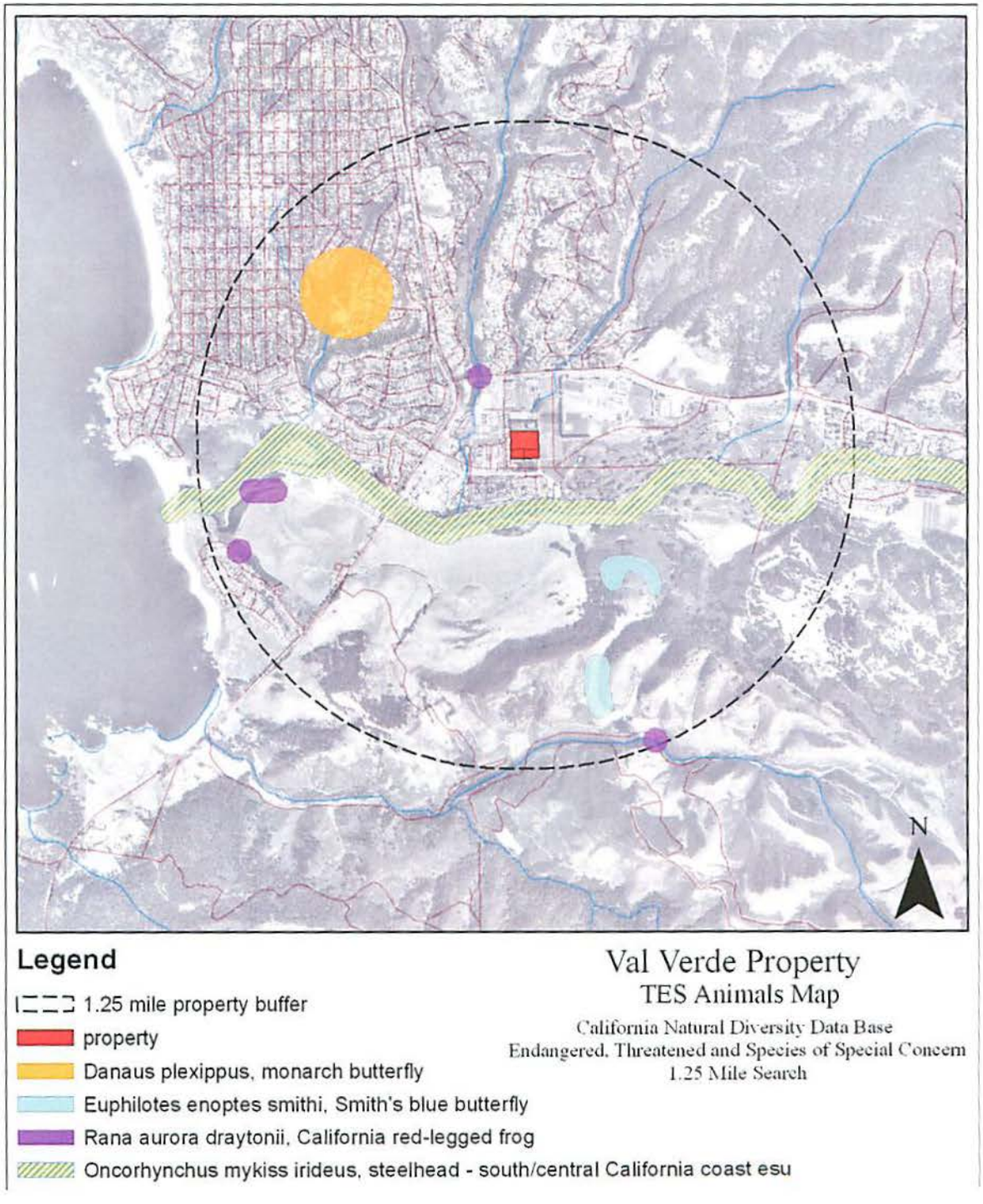
Map 1. Location of Val Verde Property in Carmel, Ca.



Map 2. Habitat types on Val Verde property.



Map 3. CNDDB plant records within 1.25 miles of Val Verde project site.



Map 4. CNDDB animal records within 1.25 miles of the Val Verde project site.

APPENDIX 1. Plant species observed at Val Verde site May 23, 2007.

Scientific Name	Common Name
Acer negundo	box elder
*Anagallis arvensis**	scarlet pimpernel
*Avena fatua**	slender wild oats
Baccharis piluaris	coyote brush
*Brassica rapa**	field mustard
*Bromus hordeaceus**	soft chess
*Carduus pycnocephalus**	Italian thistle
*Carpobrotus edulis**	hottentot fig (ice plant)
*Conium maculatum**	poison hemlock
*Cupressus macrocarpa***	Monterey cypress
Echinocystis lobata	wild cucumber
Hordeum jubatum	foxtail barley
*Lamium purpureum**	red henbit
Leymus triticoides	creeping wild rye
*Lolium perenne**	perennial ryegrass
*Malva parviflora**	common mallow
Melaleuca sp.*	honey myrtle
*Myoporum laetum**	myoporum
*Pinus radiata***	Monterey pine
Prunus ilicifolia	holly-leafed cherry
*Rubus discolor**	Himalayan blackberry
*Sonchus asper**	prickly sow thistle
*Urtica urens**	dwarf nettle

* Non-native species
** Native species planted on the site

APPENDIX 2. Animal species detected at Val Verde site May 23, 2007.

Taxa	Scientific Name	Common Name
Invertebrates		
	Pieris rapae (Lepidoptera)	cabbage white
	Papilio sp. (Lepidoptera)	swallowtail
Reptiles		
	Sceloporus occidentalis bocourtii	coast range fence lizard
Birds		
	Agelaius phoeniceus	red-winged blackbird
	Aphelocoma californica	Western scrub jay
	Callipepla californica	California quail
	Carduelis psaltria	lesser goldfinch
	Carpodacus mexicanus	house finch
	Euphagus cyanocephalus	Brewer's blackbird
	Melospiza melodia	song sparrow
	Pipilo crissalis	California towhee
	Poecile rufescens	chestnut-backed chickadee
	Zenaida macroura	mourning dove
Mammals		
	Neotoma fuscipes luciana	Monterey dusky-footed woodrat

Appendix D-2

Updated Biological Assessment

Updated Biological Assessment

For

Val Verde Property
Val Verde Drive
Carmel, California

APNs 015-021-015, -020,-021

Prepared For

Carmel Rio Road, LLC
430 Ortiz Ave. #B
San City, CA 93955

Prepared By

Rana Creek

March 23, 2012

Rana Creek Habitat Restoration
10 Harris Court, Suite C-5, Monterey, California 93940 Tele.(831) 659 - 3820 Fax.(831) 646-2106

TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1 PROPERTY LOCATION AND LEGAL DESCRIPTION 1
1.2 PROJECT DESCRIPTION 2

2.0 METHODS 2
2.1 RESEARCH 2
2.2 FIELD INSPECTIONS 3

3.0 RESULTS 3
3.1 DATABASE REVIEW – SPECIAL STATUS SPECIES 3
3.2 CRITICAL HABITAT DESIGNATIONS 10
3.3 AQUATIC HABITATS WITHIN 1.5 KM 10
3.4 SOILS AND TOPOGRAPHY 10
3.5 FIELD OBSERVATIONS 10
3.5.1 Existing Site Conditions 10
3.5.2 Habitat Types 11
3.5.3 Special Status Plants and Wildlife 11
3.5.3.1 California red-legged frog 11
3.5.3.2 White-tailed (syn. black shouldered) kite 12
3.5.3.3 Nesting Birds and other Raptors 12
3.5.3.4 Monterey dusky-footed woodrat 12
3.5.3.5 Monarch butterfly 13

4.0 DISCUSSION 13

5.0 PROJECT IMPACTS, AVOIDANCE, MINIMIZATION, AND MITIGATION MEASURES 14

6.0 REFERENCES 15

MAP 1 – SITE VICINITY MAP
MAP 2 – PROJECT SITE PLAN
MAP 2 – CNDDB 2-MILE RADIUS MAP

TABLE 1 – SPECIAL STATUS WILDLIFE, PLANTS, OR SENSITIVE NATURAL COMMUNITIES KNOWN OR WITH THE POTENTIAL TO OCCUR IN THE PROJECT AREA

APPENDIX A – SITE PHOTOGRAPHS
APPENDIX B – CALIFORNIA NATURAL DIVERSITY DATABASE QUADRANGLE RESULTS
APPENDIX C – LIST OF PLANT AND ANIMAL SPECIES OBSERVED

1.0 INTRODUCTION

Carmel Rio Road, LLC proposes to develop three parcels with residential housing off of Val Verde Drive in Carmel, Monterey County, California. Rana Creek Habitat Restoration (Rana Creek) has prepared this Updated Biological Assessment (BA), which presents current information regarding the project description; existing site conditions and biotic resources; special status species with a potential to occur in the area; potential project impacts; and recommended avoidance, minimization, and/or mitigation measures. This report is an update to a previous BA, dated May 29, 2007, prepared by Rana Creek for this project.

Findings from the 2012 research and site survey verified the same biotic resources at the site that were identified in the 2007 BA, but did not reveal any new sensitive biological resources. As discussed in the 2007 BA and confirmed during this study:

- multiple Monterey dusky-footed woodrat nests (*Neotoma fuscipes luciana)* are present at the site on APN 015-021-020;
- trees at the site provide potential nesting and foraging habitat for white-tailed kite (*Elanus leucurus)* or other raptors and marginal potential winter roosting habitat for Monarch butterflies (*Danaus plexippus*);
- dense tree and shrub vegetation on APN 015-021-020 provides nesting habitat for a variety of migratory and resident birds;
- a portion of the site (APN 015-021-020) could be used as potential temporary dispersal habitat for California red-legged frogs (*Rana draytonii*) (CRLF); and
- the majority of the site is disturbed or is utilized for agriculture and no special status plants were observed.

Implementation of the recommended avoidance, minimization, and/or mitigation measures will reduce project impacts to a less than significant level.

1.1 Property Location and Legal Description

The project site is located in Carmel, Monterey County, California and lies approximately 0.35 miles east of Highway 1 and 0.25 miles south of Carmel Valley Road (**Map 1**). The subject property consists of three parcels totaling approximately 8.0 acres: APN 015-021-015 (5.0 acres), APN 015-021-0120 (1.5 acres) and APN 015-021-021 (1.5 acres). The site is bounded towards the east by Val Verde Drive and a fallow field, towards the south by residential property, towards the west by office buildings, and towards the north by a residential property.

The site is located within the Carmel U.S. Geological Survey (USGS) 7.5-minute quadrangle at an approximate elevation of 562 feet above mean sea level. The southernmost property line is located approximately 1,025 feet north of the Carmel River channel and 920 feet north of the edge of the riparian corridor. According to the Monterey County Planning Department, the property is zoned LDR-1-D-S "low density residential".

1.2 Project Description

The proposed project consists of constructing 31 single-family and 11 inclusionary units with associated infrastructure, including paved roads and carports (**Map 2**). Access to the development will be provided by improving Val Verde Drive beginning at its intersection with Rio Road. As of the date of this report, a replacement well permit has been issued by Monterey County Department of Environmental Health for installation of one replacement water supply well and destruction of the original well (Travers well) on APN 015-021-015. It should be noted that, based on the calculation of an approximately 725-foot pumping zone of influence for the replacement Travers well (Bierman, 2012) and the designation of the well as a replacement for the existing Travers well on the same parcel, the Monterey County Planning Department determined that the replacement well installation and operation will not affect the riparian zone or in-stream flows in the Carmel River and therefore will did require a discretionary permit or BA for that aspect of the project (Monterey County Planning Department e-mail correspondence, dated February 24, 2012).

2.0 METHODS

2.1 Research

Prior to conducting the field portion of the assessment, the California Department of Fish and Game (CDFG) *California Natural Diversity Database* (CNDDB) was queried to determine if records exist for special status species within the Carmel Valley 7.5-minute quadrangle and the eight surrounding quadrangles. This broad search was used to create a target list of potential special status species. Documented special status species within approximately two miles of the project site were thoroughly reviewed and mapped in order to determine their likelihood of occurrence at the project site. In addition, aerial imagery was reviewed in order to identify other ponds, wetlands, or creeks within an approximately 1.0-mile radius of the site.

Additional data regarding the potential occurrence of special status species were gathered from the following sources: *The Status of Rare, Threatened, and Endangered Plants and Animals of California 2000-2004* (CDFG, 2005), *Inventory of Rare and Endangered Plants* (CNPS, 2010), and *An Illustrated Field Key to the Flowering Plants of Monterey County* (Matthews, 1997). Soils mapped on the property were reviewed using information provided by the Natural Resource Conservation Service (NRCS) Soil Survey. Critical habitat designations for S-CCC steelhead and CRLF were reviewed using available documentation from National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) and wetlands data was reviewed using the USFWS National Wetlands Inventory (NWI) database.

2.2 Field Inspections

The field site inspection was conducted by Rana Creek staff and thoroughly evaluated the entire site, with particular attention given to areas that could potentially provide habitat for special status or other protected plants and/or wildlife. The site inspection included the following activities:

- recording all plant and animal species detected within the project area and along access routes;
- identifying plant communities present on site;
- evaluating the project area for suitable habitat that could support special status species with a likelihood of occurrence in the area;
- taking representative photographs of the site; and
- evaluating the potential impacts of the proposed project on the biological resources at the site, including special status species and their habitats.

3.0 RESULTS

3.1 Database Review – Special Status Species

According to the 2012 CNDDB, a record for fifteen special status plants on the California Native Plant Society (CNPS) 1B List occur within two miles of the site. However, none of these plants were observed on site and in most cases, the associated conditions/habitat are not present at the site. Twelve special status animals have been documented within two miles of the site. This includes Monterey dusky-footed woodrat and white-tailed kite, which were not included in the CNDDB results but were observed on site in 2007. Monterey dusky-footed woodrat nests were observed again during the 2012 survey (see **Section 3.5**). These species are listed in **Table 1** along with their corresponding habitat requirements and likelihood of occurrence at the site. **Map 3** shows CNDDB locations of special status species within a 2-mile radius of the site.

Table 1 – Summary of Special Status Wildlife, Plants, or Sensitive Natural Communities Known or with the Potential to Occur in the Project Area – 2-Mile CNDDB Search Radius.

Species Name	Common Name	Status (Federal/State)	Probability of Occurrence in the Project Area	Habitat Requirements
WILDLIFE				
Actinemys marmorata (Emys marmorata)	Western pond turtle	--/SC	Unlikely	Western pond turtles are found in ponds, marshes, rivers, streams, and irrigation ditches containing aquatic vegetation. They are usually seen sunning on logs, banks, or rocks near banks. Individuals move up to three or four miles within a creek system, especially during "walk-abouts" before a female lays eggs. They nest in burrows which can be up to several hundred feet away from river or pond banks and may be found in woodlands, grasslands, and open forest.
Ambystoma californiense	California tiger salamander	FT/ST	No suitable habitat	The adult California tiger salamander is a semi-permanent resident of annual grasslands and valley or foothill woodlands/savannah, and is occasionally found along streams. Adults spend most of the year underground in mammal burrows, logs or rocks. The first heavy rains of winter initiate the migration of adults to permanent and temporary ponds. Larvae require ponds, lakes or vernal pools, usually within grasslands.

Species Name	Common Name	Status (Federal/State)	Probability of Occurrence in the Project Area	Habitat Requirements
Anniella pulchra	legless lizard	--/SC	No suitable habitat	Legless lizards occur in loose sandy soil, typically at the base of shrubs where leaf litter is present, and soils are slightly moist. Legless lizards forage for spiders, insect larvae, and other small insects.
Coelus globosus	globose dune beetle	--/SC	No suitable habitat	Coastal sand dunes habitat, in foredunes and sand hummocks immediately above high tide; it burrows beneath the sand surface and is most common beneath dune vegetation.
Cypseloides niger	black swift	--/SC	No suitable habitat	Nest sites occur in hollows or on ledges associated with rocky cliffs with a nearby water source. Foraging for flying insects occurs in the air, sometimes over bodies of water.
Danaus plexippus	monarch butterfly	--/SC (wintering sites)	Possible	Prefers stands of Eucalyptus and Monterey pines with protection from the wind for mass wintering sites between approximately October and March.
Elanus leucurus	white-tailed (syn. black shouldered) kite	--/SC	Possible (observed foraging on site during 2007)	Breed in lowland grasslands, wetlands, oak woodland, savannah, and riparian habitats. Foraging habitat includes dry pastures and riparian zones. Nests are built in trees; either solitary or associated with a large stand of trees.
Euphilotes enoptes smithi	Smith's blue butterfly	FT/--	No suitable habitat	Associated with coastal scrub plant community. Requires buckwheat plants (*Eriogonum parvifolium* or *Eriogonum latifolium*) as a host plant for larvae and as a nectar source for adults).

Species Name	Common Name	Status (Federal/State)	Probability of Occurrence in the Project Area	Habitat Requirements
Lasiurus cinereus	hoary bat	--/SC	No suitable habitat	Prefers open habitats or habitat mosaics, with access to trees for cover & open areas or habitat edges for feeding. Roosts in dense foliage of medium to large trees. Requires nearby water source.
*Neotoma fuscipes luciana**	Monterey dusky-footed woodrat	--/SC	Present (nest sites)	Prefer areas near a water source with available nest materials, including dead wood, leaves, and grass. Commonly associated with willow riparian and oak woodlands. The Monterey dusky-footed woodrat is a subspecies of the common woodrat, a common inhabitant of oak and riparian woodlands.
Oncorhynchus mykiss	South-central California Coast (S-CCC) ESU Steelhead	FT/SC	No suitable habitat[+]	After hatching in gravels of cold-water streams, steelhead spend the first 1 to 2 years of their lives in freshwater before migrating to the ocean. Adult steelhead spend 2 to 3 years in the ocean and then return to their spawning grounds to breed. Habitat requirements for steelhead include an intact stream system that is free of barriers, a variety of flow/depth conditions, areas with gravel substrate and minimal bed-impairing sedimentation, woody debris, and overhanging vegetation. Lagoons near river mouths can also provide rearing habitat for juvenile steelhead.

Species Name	Common Name	Status (Federal/State)	Probability of Occurrence in the Project Area	Habitat Requirements
Rana draytonii	California red-legged frog	FT/SC	Possible (dispersal)	In the coast ranges, requires ephemeral or permanent water such as ponds, reservoirs, or creeks with areas of slow moving water or pools during winter/spring. Water must last at minimum until the end of June for reproduction. During late summer or fall, adult frogs are known to utilize a variety of upland habitat types with either leaf litter or small mammal burrows. Adult frogs may travel as far as 3 miles overland in non-riparian habitats to an aquatic site.
PLANTS				
Allium hickmanii	Hickman's onion	--/CNPS 1B.2	Not present - no suitable habitat	Requires moist soil conditions and prefers sandy loam. Associated with closed-cone coniferous forest, chaparral, coastal scrub, valley and foothill grassland, and coastal prairie
Arctostaphylos hookeri ssp. hookeri	Hooker's manzanita	--/CNPS 1B.2	Not present - no suitable habitat	Associated with sandy or shaley soils and sandstone outcrops in chaparral, coastal scrub, closed-cone coniferous forest and cismontane woodland.
Arctostaphylos pumila	sandmat manzanita	--/--/CNPS 1B.2	Not present - no suitable habitat	Occurs in sandy soils within maritime chaparral or within openings in closed cone coniferous forest or oak woodland.
Clarkia jolonensis	Jolon clarkia	--/CNPS 1B.2	Not present - no suitable habitat	Edges and recently burned areas of oak woodland, coastal scrub, or chaparral

Species Name	Common Name	Status (Federal/State)	Probability of Occurrence in the Project Area	Habitat Requirements
Delphinium hutchinsoniae	Hutchinson's larkspur	--/CNPS 1B.2	Not present - no suitable habitat	Chaparral, coastal scrub, and grassland
Ericameria fasciculata	Eastwood's goldenbush	--/CNPS 1B.1	Not present - no suitable habitat	Chaparral, maritime chaparral, closed-cone pine forest, and northern coastal scrub.
Fritillaria liliacea	fragrant fritillary	--/CNPS 1B.2	Not present - no suitable habitat	Associated with clay-rich soils in coastal prairie or grasslands associated with native bunchgrasses. Commonly associated with serpentine soils.
Horkelia cuneata ssp. sericea	Kellogg's horkelia	--/--/CNPS 1B.1	Not present - no suitable habitat	Occurs in sandy or gravelly soil within closed cone coniferous forest, coastal scrub, maritime chaparral, or grassland.
Lupinus tidestromii	Tidestrom's lupine	FE/SE/CNPS1B.1	Not present - no suitable habitat	Occurs in coastal dune strand in areas of open sand with minimal competition from other vegetation
Malacothamnus palmeri var. involucratus	Carmel Valley bush mallow	--/CNPS 1B.2	Not present - no suitable habitat	Chaparral and foothill woodlands.
Malacothrix saxatilis var. arachnoidea	Carmel Valley malacothrix	--/CNPS 1B.2	Not present - no suitable habitat	Chaparral. Rock outcrops or steep rocky roadcuts
Microseris paludosa	marsh microseris	--/CNPS 1B.2	Not present - no suitable habitat	Associated with closed-cone coniferous forest, cismontane woodland, coastal scrub, valley and foothill grassland.

Species Name	Common Name	Status (Federal/State)	Probability of Occurrence in the Project Area	Habitat Requirements
Pinus radiata	Monterey pine	--/CNPS 1B	Present (not associated with a native stand)	Closed-cone coniferous forest
Piperia yadonii	Yadon's rein orchid	FE/--/CNPS 1B.1	Not present - no suitable habitat	Sandy soil in closed cone coniferous forest, woodland, maritime chaparral, and costal scrub.
Trifolium polyodon	Pacific Grove clover	--/--/CNPS 1B.1	Not present - no suitable habitat	Vernally moist swales within coastal prairie or vernally moist dune swales. Sometimes occurs along edges of old roads, trails.

Notes:

*: Not listed in CNDDB radius search

FE: Federal Endangered

FT: Federal Threatened

ST: State Threatened

SC: California Department of Fish & Game Species of Special Concern

CNPS: California Native Plant Society rare, threatened, endangered list classification

1B: Plants Categorized as Rare, Threatened, or Endangered in California and Elsewhere

3.2 Critical Habitat Designations

The project site does not occur within USFWS critical habitat areas. The nearest critical habitat area is CRLF unit MNT-2, which is located south, east, and northeast of the site. The nearest portion of MNT-2 in relation to the site is located approximately 0.25 towards the south (USFWS, 2010). In addition, the Carmel River is classified as critical habitat for the Distinct Population Segment (DPS) of S-CCC steelhead (NMFS, 2007). However, the project and its associated water supply wells are not anticipated to affect in-stream flows or fish habitat based on the distance of the project from the river (≥1,025 feet) and the results of the supply well pumping radius analysis performed by Bierman Hydrogeolgic (2012).

3.3 Aquatic Habitats Within 1.5 Km

No aquatic habitat occurs on site. The nearest aquatic habitat is associated with the Carmel River, which is located 1,025 feet south of the southern boundary of the site. The March 20th site visit occurred two days after a period of substantial rainfall and although soils were moist, no standing water was observed within the project area.

3.4 Soils and Topography

According to NRCS data, the majority of surface soils at the site consist of Pico fine sandy loam, which is well-drained soil derived from sedimentary alluvium. A small area in the southwest corner of the site (0.2 acres) is mapped as Metz fine sandy loam (NRCS, 2012).

Pico fine sandy loam
Deep, well drained soils that formed in alluvium from mostly sedimentary rocks. Pico soils are on floodplains and alluvial fans and have slopes of 0 to 9 percent. Vegetation is typically annual grasses and forbs in uncultivated areas.

Metz fine sandy loam
Very deep, somewhat excessively drained soils formed in alluvial material derived from sedimentary rock. Metz soils are on floodplains and alluvial fans, form slopes of 0 to 15 percent, and are characterized by low runoff and moderately rapid permeability. Characteristic vegetation includes annual grasses, forbs, and riparian woodland.

Based on the site plan prepared by Bestor Engineers (**Map 2**) and the site visit, the site is nearly flat, with a very slight slope towards the west-southwest.

3.5 Field Observations

3.5.1 Existing Site Conditions

Rana Creek staff conducted the field site assessment on March 20, 2012 between approximately 8:00 a.m. and 11:00 a.m. Conditions during the site visit consisted of calm winds, partly cloudy skies, and a temperature of approximately 50 degrees Fahrenheit.

The March 2012 site visit found that the site conditions on APN 015-021-020 remain as described in the 2007 BA. This parcel contains an existing residence, an adjacent shed, a variety of landscape plants, and a wooded area. The other two parcels were fallow agricultural fields dominated by weedy plant species during 2007. These parcels have since been converted to active row crops operated by Serendipity Farms (see **Appendix A**).

3.5.2 Habitat Types

The following habitat types were observed at the site on March 20, 2012.

Agriculture – Row Crops

The majority of the proposed project site consists of agricultural land that is currently in row crop production.

Mixed Woodland

A strip of mixed woodland habitat occurs around the residence on APN 015-021-020 and along the southern and eastern border of the project site adjacent to Val Verde Drive. This habitat is relatively impacted by non-native species and human disturbance and therefore does not fit a particular Holland (1986) or Keeler-Wolf (2007) association. Tree species in this area include Monterey cypress (*Cupressus macrocarpa*), Monterey pine (*Pinus radiata*), myoporum (*Myoporum laetum*), coast redwood (*Sequoia sempervirens*), box elder (*Acer negundo*), and holly-leaved cherry (*Prunus ilicifolia*). The Monterey pine and cypress trees, which as listed by the CNPS as 1B (rare or endangered in California and elsewhere) as well as the coast redwood appear to have been intentionally planted and are not part of a native stand. The understory in this habitat ranges from sparse with a groundcover of leaf litter, to dense areas of poison oak (*Toxicodendron diversilobum*), English ivy (*Hedera helix*), and poison hemlock (*Conium maculatum*). Monterey dusky-footed woodrat nests are located throughout this habitat at the site.

Residential

The southeast corner of the property contains a single house and a small storage shed. The vegetation in this area is mostly ornamental landscaping plants, non-native grasses and other common weeds.

3.5.3 Special Status Plants and Wildlife

Although much of the site consists of row crops, the wooded areas found within APN 015-021-020 contain potential and/or confirmed habitat for several special status species as well as nesting habitat for birds protected by the Migratory Bird Treaty Act of 1918 (MBTA) and California Department of Fish and Game Code 3513. Habitat on site for special status plants that could potentially occur in the area is very poor. No special status plants were observed during the site inspection. Potential or confirmed special status/protected animals are discussed below in more detail.

3.5.3.1 California red-legged frog

CRLF is a Federal threatened and California species of special concern. Although not observed on site, CRLF is known from multiple areas along the Carmel River. The

nearest CNDDB occurrence is approximately 600 feet towards the southeast from the site. CRLF are found in freshwater aquatic habitats including streams, shallow ponds, and drainages with associated riparian vegetation. Breeding occurs from November through April. Adult CRLF may disperse from breeding sites at any time of year and use a variety of upland habitat, moving through the landscape regardless of vegetation or topography. Dispersing frogs avoid desiccation during the summer months by utilizing anything that provides shade and/or moisture such as rocks, downed wood, moist leaf litter, and small mammal burrows (USFWS, 2010).

The site may provide some dispersal habitat for CRLF, especially within the wooded areas of APN 015-021-020 where soils are seasonally moist and leaf litter and rotting logs occur. The highest likelihood of dispersing CRLF occurring on the site is during the fall corresponding with the first series of winter rains. However, the majority of the site provides little cover (small mammal burrows, leaf litter) for dispersing CRLF. In addition, several barriers exist between the site and the Carmel River riparian corridor, including paved roads and a residential development.

3.5.3.2 White-tailed (syn. black shouldered) kite

The white-tailed kite is a California Fully Protected Species. White-tailed kites breed in lowland grasslands, wetlands, oak woodland, oak savannah, and riparian areas adjacent to open fields or grasslands (Small, 1994). Habitats that support larger rodent prey are more suitable. Summer habitat preferences include riparian zones and dry pastures. Nests are built in trees, either in single isolated trees or those within larger stands. Egg laying begins in February and peaks in March or April while fledging is typically complete by October. Kites are non-migratory and winter habitat is similar to breeding habitat, but without the need for nest trees. Riparian corridors represent a preferred landscape characteristic for kites in both the breeding and non-breeding seasons. White-tailed kites were observed foraging in the open fields near the project site during 2007 (Rana Creek, 2007). However, no white-tailed kites were observed during the 2012 site visit. The tall pine and cypress trees on the project site provide potential nesting habitat for kites while the nearby fallow agricultural fields provide potential foraging habitat.

3.5.3.3 Nesting Birds and other Raptors

A variety of resident birds and a red-tailed hawk (*Buteo jamaicensis*) were observed foraging in and around the wooded portion of the site among shrubs and trees (see **Appendix C**). In addition, a pair of Anna's hummingbirds (*Calypte anna*) was observed and the female was seen gathering small twigs, presumably for nest materials. Although no nests were directly observed, resident and/or migratory birds as well as raptors could potentially utilize the trees on site for nesting. As such, tree removal or use of heavy equipment has the potential to affect nesting birds during the nesting season (approximately February – August).

3.5.3.4 Monterey dusky-footed woodrat

The Monterey dusky-footed woodrat, a subspecies of the common woodrat, is a California species of special concern. These woodrats are found near a water source in areas of dense overgrowth in oak woodlands, willow riparian zones, and scrub. Woodrats tend to avoid open areas such as grasslands or woodlands with sparse understory.

Woodrats build multi-chamber nests on the ground, usually next to trees, out of dead wood, leaves, and grass. Within suitable habitats, woodrats form small colonies of three or more nests. Woodrats are primarily herbivorous, eating plant material including leaves, flowers, and acorns. The reproductive period of this species usually extends from December to September, but individuals can be reproductively active year-round. Most females are reproductively active in April and May.

Several Monterey dusky-footed woodrat nests were observed in the wooded areas of the project site during the 2007 BA (Rana Creek, 2007). During the March 20, 2012 site visit, 12 woodrat nests were observed within the wooded portions of APN 015-021-020. Nests were variable in size and condition, although several showed signs of recent activity (i.e. active nest entrance). Most nests were built adjacent to the trunks of trees and at least one was located up off the ground in the fork of a tree. Because the site lies within the range of the Monterey dusky-footed woodrat, it is assumed that the nests on site belong to that species.

3.5.3.5 Monarch butterfly

The monarch butterfly is listed on the California Department of Fish & Game special animals list (CDFG, 2012). Monarch butterflies arrive along the California coast during the fall and can form large clusters in the branches of eucalyptus trees or Monterey pines. These mass wintering sites are typically located within stands of the favorable tree species that are protected from direct, strong winds. Although some of the trees found within APN 015-021-020 could potentially provide a mass wintering location, the habitat is relatively poor due to the isolated nature and limited number of preferred tree species. No monarch butterflies were observed during the 2012 site inspection.

4.0 DISCUSSION

The 2012 data search and field inspection confirmed that site conditions and environmental conditions remain similar to those that were observed during the 2007 BA, with the exception of the presence of active row crops on APN 015-021-015 and 015-021-021. Most of the project site provides little habitat for special status species. However, the wooded portion of the site within APN 015-021-020 provides the highest quality habitat for special status species especially white tailed kite, Monterey dusky-footed woodrat, and other nesting birds or raptors protected by the MBTA and Fish & Game Code. In addition, portions of the wooded habitat provide potential, but poor quality mass wintering sites for monarch butterfly.

Although the habitat on-site is generally not favorable for CRLF and breeding habitat is absent, the presence of the riparian corridor associated with the Carmel River and several CNDDB observations of CRLF less than 1,000 feet away indicate that dispersing CRLF could potentially occur within the wooded areas of the site. Recommended avoidance and minimization measures required to reduce project impacts to a less than significant level are provided below in Section 5.

5.0 PROJECT IMPACTS, AVOIDANCE, MINIMIZATION, AND MITIGATION MEASURES

Because site and environmental conditions were similar to previous observations, the recommended avoidance, minimization, and/or mitigation measures are consistent with the 2007 BA. Provided that these measures are followed, any potential impacts of the project should be reduced to a less than significant level. Initial vegetation/tree removal within APN 015-021-020 should be timed so that it occurs during the fall months, as described in the avoidance, minimization, and mitigation measures listed below.

1. **Impact:** Monterey dusky-footed woodrats (i.e. nests) present on site may be harmed by construction activities.

Mitigation 1A: Initial vegetation removal should ideally occur when woodrats are least likely to be reproducing (October - November). A pre-construction survey for woodrat nests will be conducted by a qualified biologist prior to the onset of construction activities. All woodrat nests located during the survey will be flagged and a 25 foot buffer area established around each nest or group of nests. If nests cannot be avoided and must be removed to allow construction activities, the nest(s) will be dismantled by hand prior to grading or vegetation removal activities. Dismantling of nests will be monitored by a qualified biologist. If young are encountered during nest dismantling, the dismantling activity will cease and the material carefully replaced back on the nest. Construction activities within 25 feet of these active nests will cease. The active nests will be left undisturbed for a period of 2 to 3 weeks to allow development of young. Once the biologist determines that young are capable of being independent, nest dismantling will be allowed to continue.

2. **Impact**: The project site provides potential nesting and foraging habitat for white-tailed kites, a California Fully Protected Species. This species, as well as other bird species protected under the MBTA and California Fish & Game code, potentially nesting at the project site, may be disturbed by construction activities.

Avoidance & Minimization 2A: Initial vegetation and tree removal should be timed to occur between September 1 and January 31. If vegetation removal cannot occur during this timeframe, a qualified biologist shall conduct nest surveys on the site prior to vegetation removal. The survey shall be conducted no more than 14 days prior to the onset of construction. If active nests of white-tailed kite or other birds species protected by the MTBA or California Fish & Game code are present in the construction zone, a temporary fence shall be erected 200 feet (or less if determined appropriate by the biologist) around the nest site. Upon recommendation of the biologist, clearing and construction within the fenced area shall be postponed or halted until juveniles have fledged and there is no evidence of a second nesting attempt. The biologist shall serve as

construction monitor during those periods when construction activities will occur near active nest areas to ensure that no inadvertent impacts to the nests occur.

3. **Impact:** Overwintering monarch butterflies may be harmed or disturbed by construction activities.

   Avoidance & Minimization 3A: If construction activities occur during times when monarch butterflies may be present (October – March), all tall trees shall be inspected for the presence of monarchs by a qualified biologist prior to work being done around the trees. If monarchs are present in the trees, work associated with or around the subject trees shall be delayed until the overwintering monarch butterflies are no longer present.

4. **Impact:** Dispersing CRLF has the potential to occur on the subject site and could be harassed or harmed by construction activities.

   Avoidance & Minimization 4A: Vegetation removal should ideally occur during the fall, before the first winter rainfall event occurs. No vegetation removal or grading will take place during periods of rain. Precautions will also be exercised to prevent puddle formation, which could attract CRLF. If initial vegetation clearing and ground disturbance is anticipated to occur between October 15 and May 31, a pre-construction/grading survey for CRLF shall be conducted. The pre-construction survey shall address all areas that will be affected by vegetation removal or grading activities and must occur no earlier than 4 days prior to the onset of grading. If CRLF are observed during the pre-construction survey, all grading/construction activities shall be postponed and USFWS shall be consulted for further guidance.

6.0 REFERENCES

Bierman Hydrogeologic. 2012. Rio Road & Val Verde Subdivision, APNs 015-021-015, 020, & 021: Letter to Monterey County Planning and Building Inspection Department, dated February 23, 2012.

California Natural Diversity Database. 2012. California natural diversity database website. http://www.dfg.ca.gov/whdab/html/cnddb.html.

California Native Plant Society. 2012. Inventory of rare and endangered plants (online edition, v8-01a <http://www.cnps.org/inventory>. Accessed on March 7, 2012.

Holland, R.F. 1986. Preliminary descriptions of the terrestrial natural communities of California: Non-Game Heritage Program, California Department of Fish & Game Sacramento, CA.

Keeler-Wolf, T. and Shoenherr, A. 2007. Terrestrial vegetation of california.

Mathews, M. A and The California Native Plant Society. 1997. An illustrated field key to the flowering plants of Monterey County.

Natural Resource Conservation Service. 2012. soil survey: Natural Resources Conservation Service, United States Department of Agriculture. Official Soil Series Descriptions, Available at http://soils.usda.gov/technical/classification/osd/index.html Accessed March 7, 2012.

Rana Creek Habitat Restoration. 2007. Biological assessment for Val Verde property, Val Verde Drive, Carmel: dated May 29, 2007.

Small, A. 1994. California birds, their status and distribution: Ibis Publishing Company.

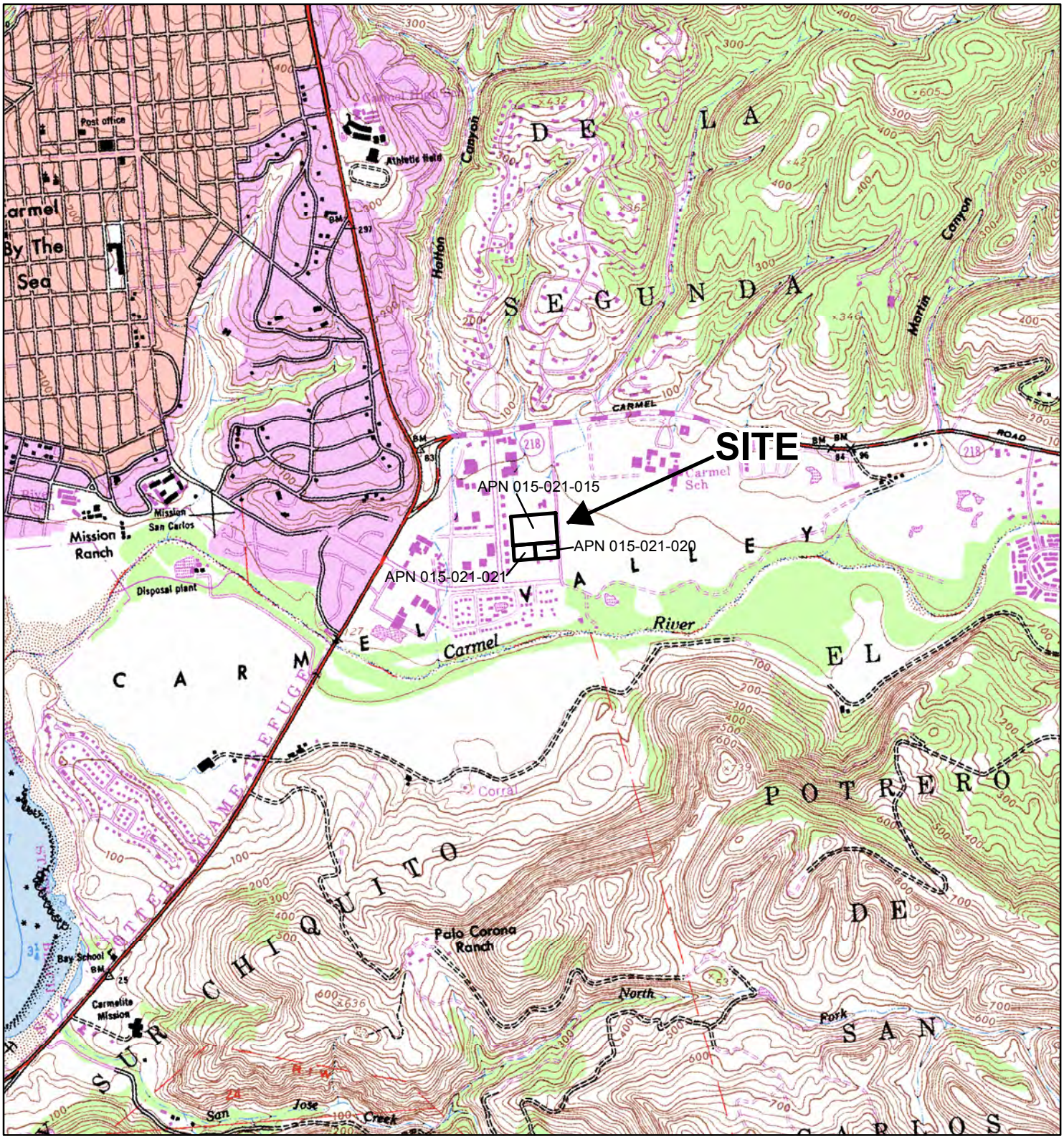
Stebbins, R.C. 2003. Western reptiles and amphibians, 3rd edition.

[USFWS] U.S. Fish & Wildlife Service. 2005. Revised guidance on site assessments and field surveys for the California red-legged frog: dated August 2005.

USFWS. 2010. Endangered and threatened wildlife and plants – Revised Designation of Critical Habitat for the California Red-Legged Frog: Federal Register Vol. 75, No. 51. March 17, 2010, Rules and Regulations.

USFWS. 2012. http://crithab.fws.gov/flex/crithabMapper.jsp. Accessed March 9, 2012

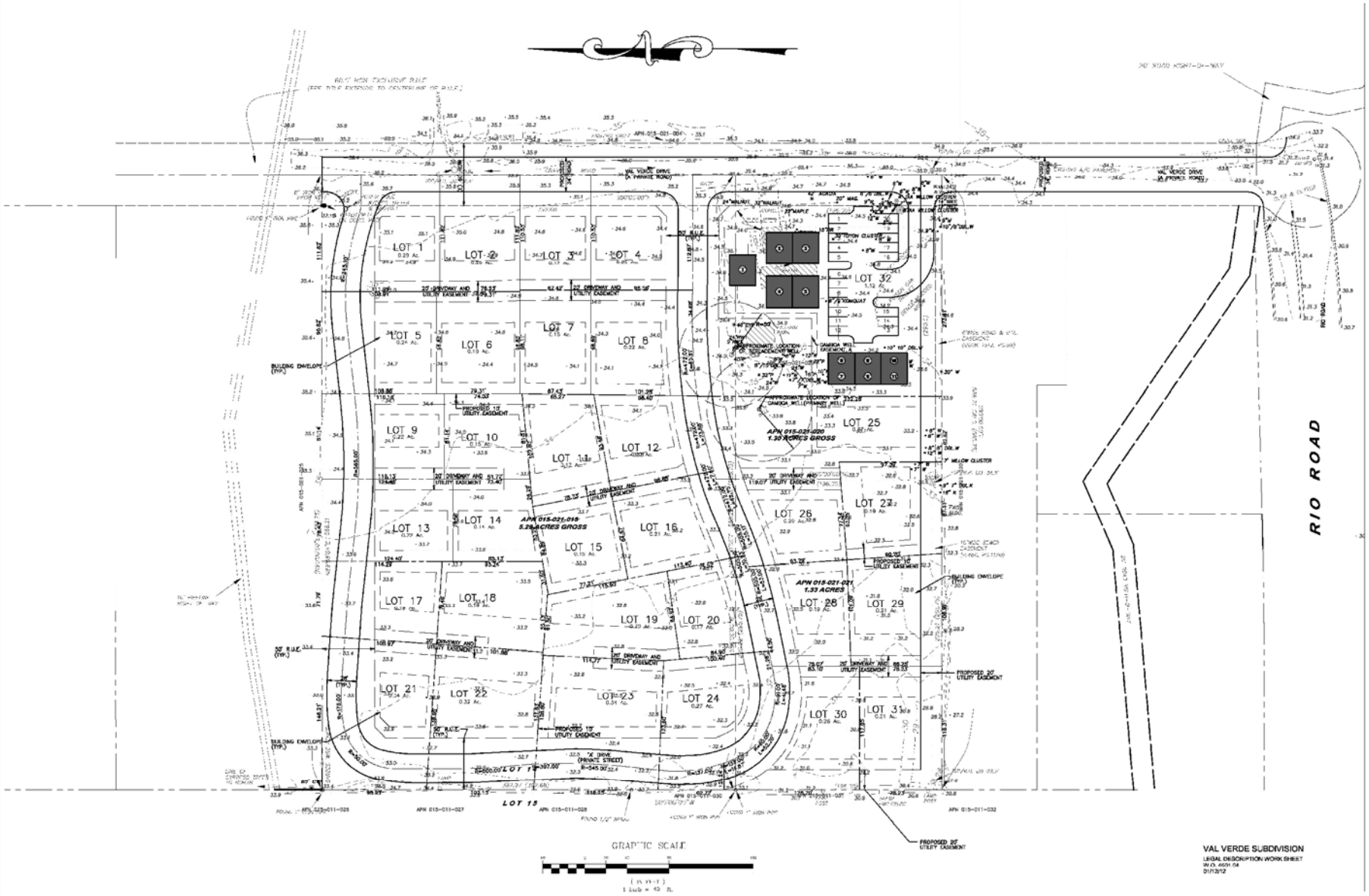
USFWS. 2012. National Wetlands Inventory: http://www.fws.gov/wetlands/Data/Mapper.html. Accessed March 9, 2012.



Map 1 - Site Vicinity

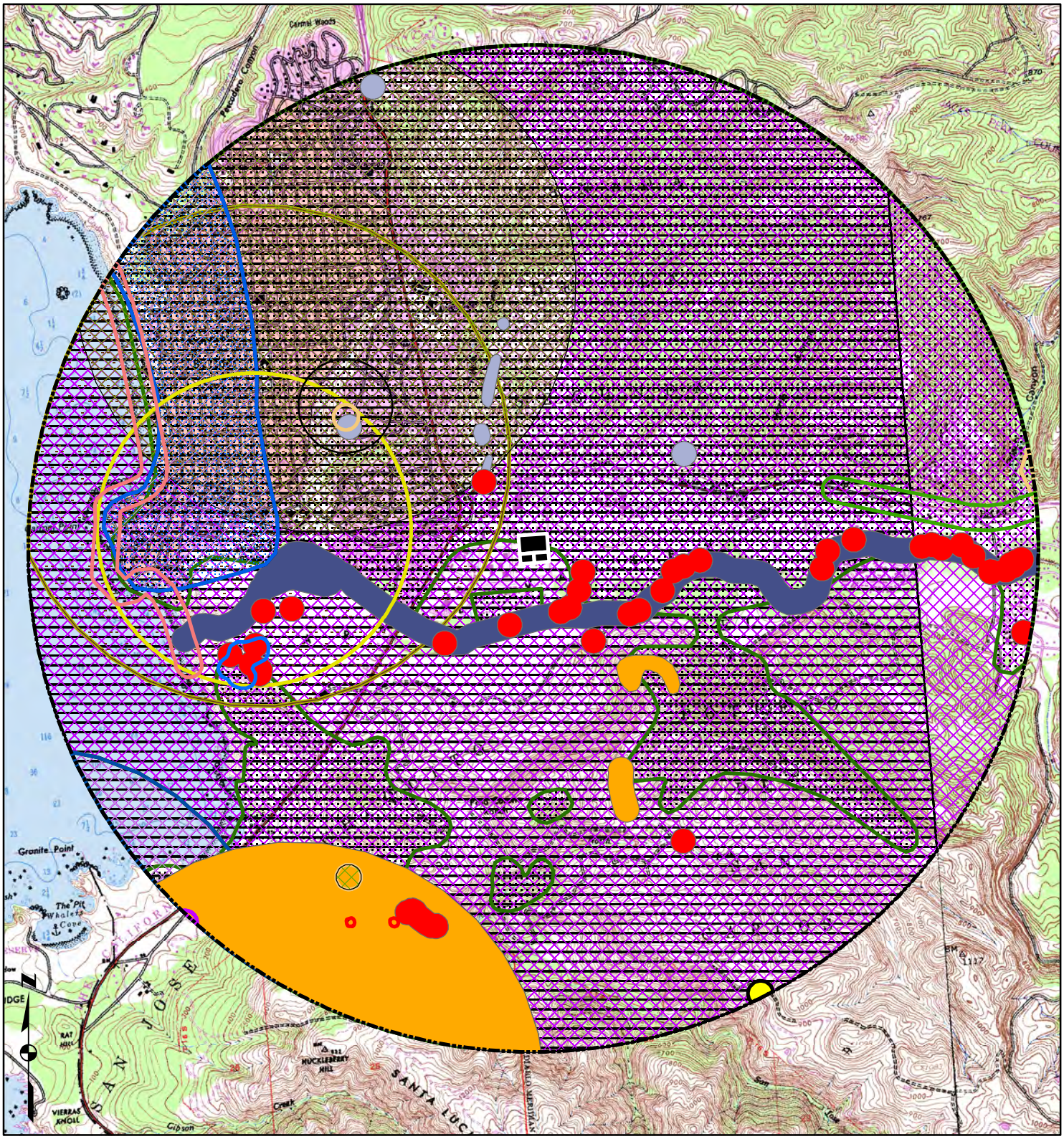
Updated Biological Assessment
Val Verde Drive, Carmel, CA
Date: March, 2012

rana creek
10 Harris Court, Suite C-5
Monterey, CA 93940
Ph 831 . 659 . 3820
Fx 831 . 659 . 4851
www.ranacreek.com



Map 2 - Project Site Plan
Updated Biological Assessment
Val Verde Drive, Carmel, CA
Date: March, 2012

rana creek
10 Harris Court, Suite G-5
Monterey, CA 93940
Ph 831. 659. 3820
Fx 831. 659. 4851
www.ranacreek.com



0 0.5 1 2 Miles

Approximate Scale

Legend

- Project Parcels
- CNDDB_2mile

CNDDB

- Allium hickmanii
- Ambystoma californiense
- Anniella pulchra nigra
- Arctostaphylos hookeri ssp. hookeri
- Arctostaphylos pumila
- Central Maritime Chaparral
- Clarkia jolonensis
- Coelus globosus
- Cypseloides niger
- Danaus plexippus
- Delphinium hutchinsoniae
- Emys marmorata
- Ericameria fasciculata
- Euphilotes enoptes smithi
- Fritillaria liliacea
- Horkelia cuneata ssp. sericea
- Lasiurus cinereus
- Lupinus tidestromii
- Malacothamnus palmeri var. involucratus
- Malacothamnus palmeri var. palmeri
- Microseris paludosa
- Oncorhynchus mykiss irideus
- Pinus radiata
- Piperia yadonii
- Rana draytonii
- Trifolium polyodon

Map 3 - California Natural Diversity Database 2-Mile Radius Map

Updated Biological Assessment
Val Verde Drive, Carmel, CA
Date: March, 2012

rana creek
10 Harris Court, Suite C-5
Monterey, CA 93940
Ph 831 . 659 . 3820
Fx 831 . 659 . 4851
www.ranacreek.com

Photo 1: View from Val Verde Dr. of row crops on APN 015-021-015 and adjoining commercial area towards the west.

Photo 2: Empty fallow field across Val Verde Drive, east of the site. View towards the southeast.

Photo 3: View of row crops from northeast corner of site. Old Travers well is in the foreground.

Photo 4: Existing residence on APN 015-021-020.

Photo 5: View south from APN 015-021-015 towards residential lot and cluster of mature Monterey pine, cypress, redwood, and other trees.

Photo 6: View south from APN 015-021-021 towards property line and adjoining area containing dense vegetation.

Photo 7: Woodrat nest in poison hemlock patch on APN 015-021-020

Photo 8: Entrance to woodrat nest on APN 015-021-020

Photo 9: Woodrat nest in tree on APN 015-021-020

Photo 10: Woodrat nest on APN 015-021-020

Photo 11: Woodrat nest on APN 015-021-020

Photo 12: Wooded area on APN 015-021-020 containing seasonally moist soils and abundant leaf litter.

Appendix B
CNDDB - Surrounding Quadrangle Search
March 2012
Val Verde Drive Updated Biological Assessment

Species Name	Common Name	FEDLIST	CALLIST	GRANK	SRANK	CNPS Rank
Agelaius tricolor	tricolored blackbird	None	None	G2G3	S2	
Allium hickmanii	Hickman's onion	None	None	G2	S2.2	1B.2
Ambystoma californiense	California tiger salamander	Threatened	Threatened	G2G3	S2S3	
Anniella pulchra nigra	black legless lizard	None	None	G3G4T2T3Q	S2	
Anniella pulchra pulchra	silvery legless lizard	None	None	G3G4T3T4Q	S3	
Arctostaphylos edmundsii	Little Sur manzanita	None	None	G2	S2.2	1B.2
Arctostaphylos hookeri ssp. hookeri	Hooker's manzanita	None	None	G3T2?	S2?	1B.2
Arctostaphylos montereyensis	Toro manzanita	None	None	G2	S2.1	1B.2
Arctostaphylos pajaroensis	Pajaro manzanita	None	None	G2	S2.1	1B.1
Arctostaphylos pumila	sandmat manzanita	None	None	G2	S2.2	1B.2
Astragalus tener var. titi	coastal dunes milk-vetch	Endangered	Endangered	G1T1	S1	1B.1
Athene cunicularia	burrowing owl	None	None	G4	S2	
Buteo regalis	ferruginous hawk	None	None	G4	S3S4	
Castilleja ambigua ssp. insalutata	pink johnny-nip	None	None	G4T1	S1	1B.1
Central Dune Scrub	Central Dune Scrub	None	None	G2	S2.2	
Central Maritime Chaparral	Central Maritime Chaparral	None	None	G2	S2.2	
Centromadia parryi ssp. congdonii	Congdon's tarplant	None	None	G4T2	S2	1B.2
Charadrius alexandrinus nivosus	western snowy plover	Threatened	None	G4T3	S2	
Chorizanthe pungens var. pungens	Monterey spineflower	Threatened	None	G2T2	S2.2	1B.2
Chorizanthe robusta var. robusta	robust spineflower	Endangered	None	G2T1	S1	1B.1
Clarkia jolonensis	Jolon clarkia	None	None	G2	S2.2	1B.2
Coelus globosus	globose dune beetle	None	None	G1	S1	
Collinsia multicolor	San Francisco collinsia	None	None	G2	S2.2	1B.2
Cordylanthus rigidus ssp. littoralis	seaside bird's-beak	None	Endangered	G5T1	S1.1	1B.1
Cypseloides niger	black swift	None	None	G4	S2	
Danaus plexippus	monarch butterfly	None	None	G5	S3	
Delphinium californicum ssp. interius	Hospital Canyon larkspur	None	None	G3T2?	S2?	1B.2
Delphinium hutchinsoniae	Hutchinson's larkspur	None	None	G2	S2.1	1B.2
Emys marmorata	western pond turtle	None	None	G3G4	S3	
Eremophila alpestris actia	California horned lark	None	None	G5T3Q	S3	
Ericameria fasciculata	Eastwood's goldenbush	None	None	G2	S2.1	1B.1
Eriogonum nortonii	Pinnacles buckwheat	None	None	G2	S2.3	1B.3
Erysimum ammophilum	sand-loving wallflower	None	None	G2	S2.2	1B.2
Erysimum menziesii ssp. menziesii	Menzies' wallflower	Endangered	Endangered	G3?T1	S1	1B.1
Erysimum menziesii ssp. yadonii	Yadon's wallflower	Endangered	Endangered	G3?T1	S1	1B.1
Eucyclogobius newberryi	tidewater goby	Endangered	None	G3	S2S3	
Euphilotes enoptes smithi	Smith's blue butterfly	Endangered	None	G5T1T2	S1S2	
Falco mexicanus	prairie falcon	None	None	G5	S3	
Fritillaria liliacea	fragrant fritillary	None	None	G2	S2	1B.2
Gilia tenuiflora ssp. arenaria	sand gilia	Endangered	Threatened	G3G4T2	S2	1B.2
Hesperocyparis goveniana	Gowen cypress	Threatened	None	G1	S1.2	1B.2
Hesperocyparis macrocarpa	Monterey cypress	None	None	G1	S1.2	1B.2
Horkelia cuneata ssp. sericea	Kellogg's horkelia	None	None	G4T1	S1.1	1B.1
Lasiurus cinereus	hoary bat	None	None	G5	S4?	
Lasthenia conjugens	Contra Costa goldfields	Endangered	None	G1	S1	1B.1
Layia carnosa	beach layia	Endangered	Endangered	G2	S2	1B.1
Linderiella occidentalis	California linderiella	None	None	G3	S2S3	
Lupinus tidestromii	Tidestrom's lupine	Endangered	Endangered	G2	S2.1	1B.1
Malacothamnus palmeri var. involucratus	Carmel Valley bush-mallow	None	None	G3T2Q	S2.2	1B.2
Malacothamnus palmeri var. palmeri	Santa Lucia bush-mallow	None	None	G3T2Q	S2.2	1B.2
Malacothrix saxatilis var. arachnoidea	Carmel Valley malacothrix	None	None	G5T2	S2.2	1B.2
Microseris paludosa	marsh microseris	None	None	G2	S2.2	1B.2
Monolopia gracilens	woodland woollythreads	None	None	G2G3	S2S3	1B.2
Monterey Cypress Forest	Monterey Cypress Forest	None	None	G1	S1.2	
Monterey Pine Forest	Monterey Pine Forest	None	None	G1	S1.1	
Monterey Pygmy Cypress Forest	Monterey Pygmy Cypress Forest	None	None	G1	S1.1	
Northern Bishop Pine Forest	Northern Bishop Pine Forest	None	None	G2	S2.2	
Northern Coastal Salt Marsh	Northern Coastal Salt Marsh	None	None	G3	S3.2	
Oceanodroma homochroa	ashy storm-petrel	None	None	G2	S2	
Oncorhynchus mykiss irideus	steelhead - south/central California coast DPS	Threatened	None	G5T2Q	S2	
Pelecanus occidentalis californicus	California brown pelican	Delisted	Delisted	G4T3	S1S2	
Phrynosoma blainvillii	coast horned lizard	None	None	G4G5	S3S4	
Pinus radiata	Monterey pine	None	None	G1	S1.1	1B.1
Piperia yadonii	Yadon's rein orchid	Endangered	None	G2	S2.1	1B.1
Plagiobothrys uncinatus	hooked popcorn-flower	None	None	G2	S2.2	1B.2
Potentilla hickmanii	Hickman's cinquefoil	Endangered	Endangered	G1	S1	1B.1
Rana draytonii	California red-legged frog	Threatened	None	G4T2T3	S2S3	
Reithrodontomys megalotis distichlis	Salinas harvest mouse	None	None	G5T1	S1	
Rosa pinetorum	pine rose	None	None	G2Q	S2.2	1B.2
Sidalcea malachroides	maple-leaved checkerbloom	None	None	G3G4	S3S4.2	4.2
Stebbinsoseris decipiens	Santa Cruz microseris	None	None	G2	S2.2	1B.2
Taxidea taxus	American badger	None	None	G5	S4	
Tortula californica	California screw moss	None	None	G2?	S2	1B.2
Trifolium buckwestiorum	Santa Cruz clover	None	None	G1	S1.1	1B.1
Trifolium hydrophilum	saline clover	None	None	G2	S2	1B.2
Trifolium polyodon	Pacific Grove clover	None	Rare	G1Q	S1.1	1B.1
Trifolium trichocalyx	Monterey clover	Endangered	Endangered	G1	S1	1B.1
Valley Needlegrass Grassland	Valley Needlegrass Grassland	None	None	G3	S3.1	

Notes: CNDDB Quad Results includes USGS 7.5-minute Quadrangles - Marina, Monterey, Mt. Carmel, Seaside, Soberanes Point

Appendix C
Plant and Animal Species Observed on March 20, 2012
Val Verde Drive Updated Biological Assessment

Species Name	Common Name	Native
PLANTS		
Acer negundo	box elder	y
Avena barbata	slender wild oat	n
Baccharis pilularis	coyote brush	y
Brassica rapa	field mustard	n
Bromus carinatus	California brome	y
Bromus diandrus	ripgut grass	n
Bromus hordaceous	soft chess brome	n
Carduus pycnocephalus	Italian thistle	n
Carpobrotus edulis	iceplant	n
Chamomilla suaveolens	pineapple weed	n
Conium maculatum	poison hemlock	n
Cupressus macrocarpa	Monterey cypress	y
Erodium botrys	long-beaked filaree	n
Hedera helix	English ivy	n
Hordeum jubatum	foxtail barley	n
Lolium multiflorum	Italian ryegrass	n
Malva parviflora	common mallow	n
Marah fabaceus	wild cucumber	y
Melaleuca sp.	honey myrtle	n
Melilotus albus	white sweetclover	n
Myoporum laetum	lollypop tree	n
Pinus radiata	Monterey pine	y
Polypogon monspeliensis	rabbit's foot grass	n
Prunus ilicifolia	holly-leaved cherry	y
Raphanus raphanistrum	wild radish	n
Rubus ursinus	California blackberry	y
Rumex sp.	dock	n
Sequoia sempervirens	redwood	y
Sonchus oleraceus	common sowthistle	n
Toxicodendron diversilobum	poison oak	y
Tropaeolum majus	nasturtium	n
WILDLIFE		
Birds		
Aphelocoma californica	Western scrub jay	
Bombycilla cedrorum	cedar waxwing	
Buteo jamaicensis	red-tail hawk	
Calypte anna	Anna's hummingbird	
Catharus guttatus	hermit thrush	
Corvus brachyrhynchos	American crow	
Melospiza melodia	song sparrow	
Turdus migratorius	American robin	
Mammals		
Neotoma fuscipes luciana	Monterey dusky-footed woodrat	

Appendix E

Cultural Reports

Appendix E-1

Preliminary Archaeological Reconnaissance

ARCHAEOLOGICAL CONSULTING

P.O. BOX 3377
SALINAS, CA 93912
(831) 422-4912

PRELIMINARY ARCHAEOLOGICAL RECONNAISSANCE FOR ASSESSOR'S PARCELS 015-021-015, 015-021-020, AND 015-021-021, IN CARMEL, MONTEREY COUNTY, CALIFORNIA

by

Mary Doane, B.A., and Gary S. Breschini, Ph.D., RPA

June 26, 2007

Prepared for

Carmel Rio Road, LLC

SUMMARY: PROJECT 4041
RESULTS: NEGATIVE
ACRES: ±8.0
SITES: NONE
UTMG: NE 5.9838/40.4428, SE 5.9838/40.4412, SW 5.9822/40.4412, NW 5.9822/40.4428
MAP: USGS 7.5 MINUTE MONTEREY QUADRANGLE

REQUIRED FOR
MONTEREY CO. PLANNING DEPT.
EVIDENCE OF:

	YES	NO	N/A	SEE TEXT
SACRED/RELIGIOUS SITE			✓	
NATIVE AMERICAN REMAINS		✓		
ANYTHING OF ARCHAEOLOGICAL SIGNIFICANCE		✓		
FINDINGS OF HISTORICAL SIGNIFICANCE		✓		

INTRODUCTION

In June 2007 Archaeological Consulting was authorized by Brian Clark of Carmel Rio Road, LLC to prepare a Preliminary Archaeological Reconnaissance report for a proposed subdivision of three existing parcels in Carmel, Monterey County, California.

As part of our methodology in the preparation of this report, we have conducted: 1) a previous background records search at the Northwest Regional Information Center of the California Historical Resources Information System, located at Sonoma State University, Rohnert Park; and 2) a field reconnaissance of the project area. The following report contains the results of these investigations as well as our conclusions and recommendations.

PROJECT LOCATION AND DESCRIPTION

The project area is located at 25600 Val Verde in Carmel, Monterey County, California (see Maps 1 and 2). The Assessor's Parcel Numbers are 015-021-015, 015-021-020 and 015-021-021. The Universal Transverse Mercator Grid (UTMG) coordinates for the approximate corners of the eight acre project area are as follows: NE 5.9838/40.4428, SE 5.9838/40.4412, SW 5.9822/40.4412, and NW 5.9822/40.4428 on the USGS 7.5 minute Monterey Quadrangle (1947; photorevised 1983). The project proposes a subdivision which would result in thirty one market rate homes and eleven inclusionary units.

At the time of the reconnaissance most of the project area was fallow agricultural land which was vegetated in weeds and volunteer vegetables. A portion of parcel 021 had been covered with imported fill which contained some abalone shell fragments. Parcel 020 contained a house, a small shed, lawns and garden plantings. The southern part of parcel 020 was densely vegetated with brush. Surface soil visibility was fair to good through most of the project area. Overall, soil visibility was considered adequate for the purposes of the reconnaissance.

PROJECT METHODOLOGY

The methodology used in the preparation of this report included two primary steps, as follows:

Background Research

The background research for this project included an examination of the archaeological site records, maps, and project files of the Northwest Regional Information Center of the California Historical Resources Information System, located at Sonoma State University, Rohnert Park, California. In addition, our extensive personal files and maps were examined for supplemental information, such as rumors of historic or prehistoric resources in the general project area.

The Regional Information Centers have been established by the California Office of Historic Preservation as the local repository for all archaeological reports which are prepared under cultural resource management regulations. The background literature search at the appropriate Regional Information Center is required by state guidelines and current professional standards. Following completion of the project, a copy of the report must be deposited with that organization.

These literature searches are undertaken to determine if there are any previously recorded archaeological resources within the project area, and whether the area has been included in any previous archaeological research or reconnaissance projects.

Field Reconnaissance

The field reconnaissance was conducted by Mary Doane, B.A., and Patrick Cave on June 22, 2007. The survey consisted of a "general surface reconnaissance" of all project areas which could reasonably be expected to contain visible cultural resources, and which could be viewed without major vegetation removal or excavation.

RESULTS OF THE RECONNAISSANCE

Background Research

The record search of the files at the Northwest Regional Information Center found that there are two recorded cultural resources located within one kilometer of the project parcels. The nearer site is 300 meters (±1,000 feet) to the northwest. The project area appears to have been at least partially included in a previous study (Runnings and Breschini 1988).

In addition, the California Inventory of Historical Resources (March 1976), California Historical Landmarks, and the National Register of Historic Places were checked for listed cultural resources which might be present in the project area; none were discovered.

The project area lies within the currently recognized ethnographic territory of the Costanoan (often called Ohlone) linguistic group. Discussions of this group and their territorial boundaries can be found in Breschini, Haversat, and Hampson (1983), Kroeber (1925), Levy (1978), Margolin (1978), and other sources. In brief, the group followed a general hunting and gathering subsistence pattern with partial dependence on the natural acorn crop. Habitation is considered to have been semi-sedentary and occupation sites can be expected most often at the confluence of streams, other areas of similar topography along streams, or in the vicinity of springs. These original sources of water may no longer be present or adequate. Also, resource gathering and processing areas, and associated temporary campsites, are frequently found on the coast and in other locations containing resources utilized by the group. Factors which influence the location of these sites include the presence of suitable exposures of rock for bedrock mortars or other milling activities, ecotones, the presence of specific resources (oak groves, marshes, quarries, game trails, trade routes, etc.), proximity to water, and the availability of shelter. Temporary camps or other activity areas can also be found along ridges or other travel corridors.

Field Research

The visible surface soil in the project area was a tan to light gray sandy silt. None of the materials frequently associated with prehistoric cultural resources in this area (dark midden soil, eroded marine shell fragments, fire-affected rock, flaked or ground stone, weathered bone fragments, formal artifacts, etc.) were observed during the reconnaissance in the native soil. The imported fill on parcel 021 and the southern part of parcel 015 contained abalone shell fragments.

No potentially significant historic period archaeological materials were seen in the project area.

CONCLUSIONS AND RECOMMENDATIONS

Based upon the background research and the surface reconnaissance, we have concluded that the project area does not contain surface evidence of potentially significant archaeological resources. Because of this, we make the following recommendation:

- The proposed subdivision development should not be delayed for archaeological reasons.

Because of the possibility of unidentified (e.g., buried) cultural resources being found during any construction, we recommend that the following standard language, or the equivalent, be included in any permits issued within the project area:

- If archaeological resources or human remains are accidentally discovered during construction, work shall be halted within 50 meters (150 feet) of the find until it can be evaluated by a qualified professional archaeologist. If the find is determined to be significant, appropriate mitigation measures shall be formulated and implemented.

REFERENCES

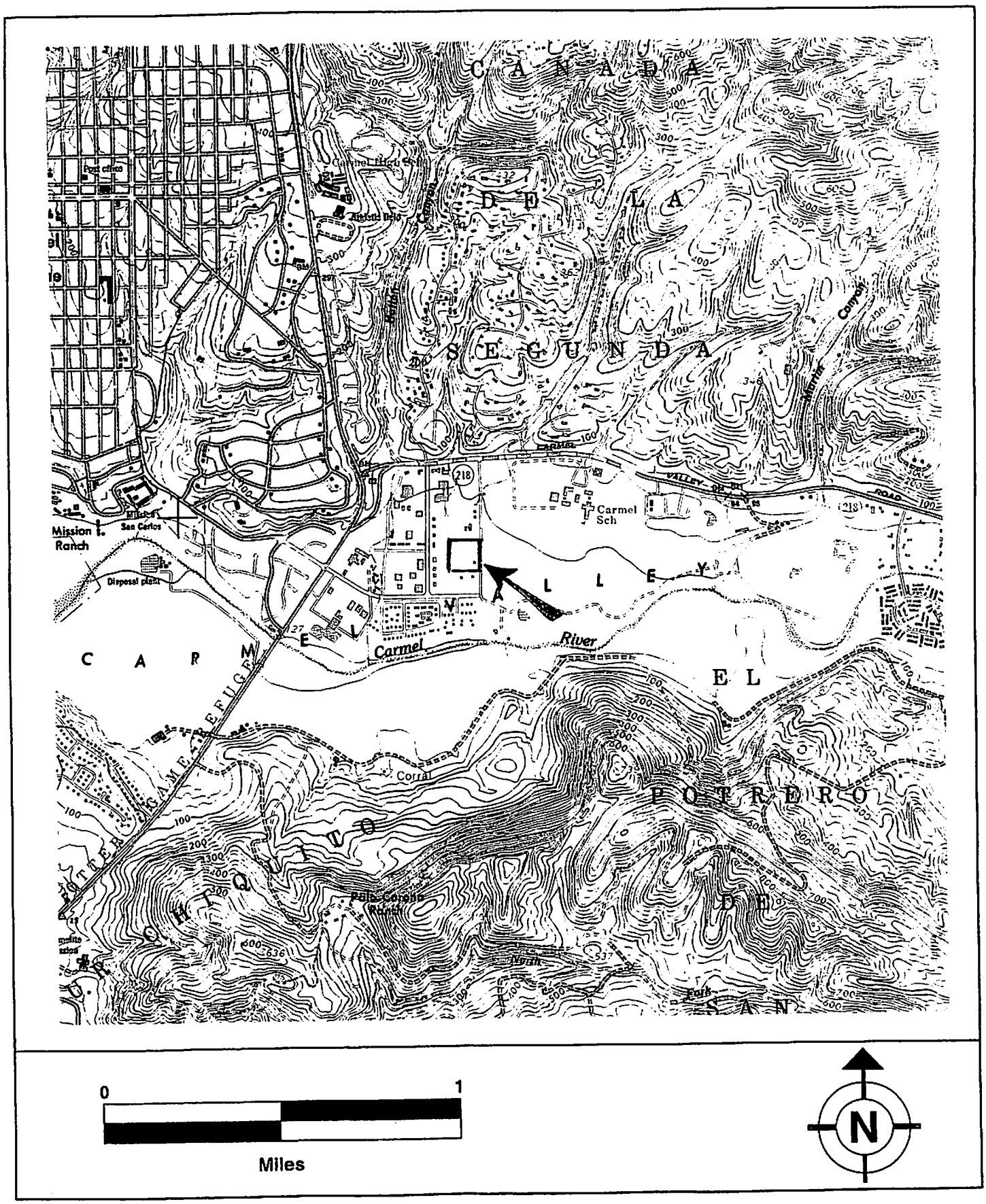
Breschini, G. S., T. Haversat, and R. P. Hampson
1983 **A Cultural Resources Overview of the Coast and Coast-Valley Study Areas [California].** Coyote Press, Salinas.

Kroeber, A. L.
1925 Handbook of the Indians of California. **Bureau of American Ethnology Bulletin** 78.

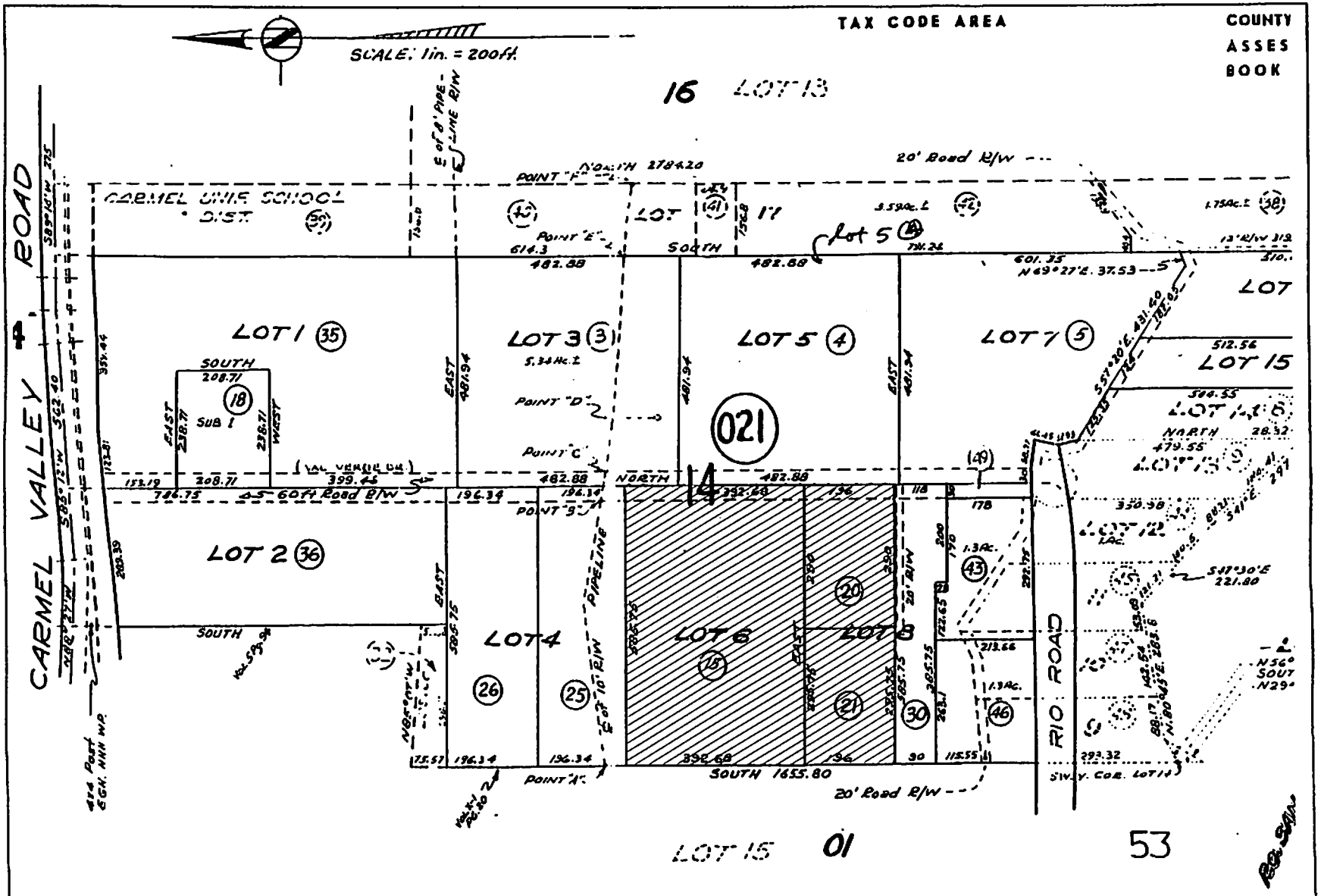
Levy, R.
1978 Costanoan. Pp. 485-495 in **Handbook of North American Indians, Vol. 8, California.** Smithsonian Institution, Washington, D.C.

Margolin, M.
1978 **The Ohlone Way.** Heyday Books, Berkeley.

Runnings, A. and G. S. Breschini
1988 **Preliminary Cultural Resources Reconnaissance of a Proposed Development on Via Verde Way, Carmel Valley, Monterey County, California.** On file with the Northwest Information Center, Sonoma State University.



Map 1. Project Location.



Map 2. Project Location.

Appendix E-2

Addendum to the Preliminary Archaeological Reconnaissance

ARCHAEOLOGICAL CONSULTING

P.O. BOX 3377
SALINAS, CA 93912
(831) 422-4912
e-mail Coyote@coyotepress.com

June 8, 2016

Brian Clark
430 Ortiz Ave., Suite B
Sand City, CA 93955
Via email: brian@surfloan.com

Brian:

I am writing, as you requested, concerning a report we did for you in 2007. You indicate that the County wants an update.

In 2007, in our Project 4041, we examined three parcels: APNs 015-021-015, -020, and -021, in Carmel, Monterey County, California. We concluded at that time that there were no potentially significant archaeological resources within those parcels.

Since our previous survey found no evidence of archaeological resources on the parcel, and survey standards have not changed in the intervening years, we see no need for an additional Archaeological Reconnaissance.

Let me know if you need anything additional on this.

Sincerely,

Gary S. Breschini

Gary S. Breschini, Ph.D.

Appendix E-3

Phase I Historic Review

KENT L. SEAVEY

310 LIGHTHOUSE AVENUE
PACIFIC GROVE, CALIFORNIA 93950
(831)375-8739

April 8, 2010

Mr. Brian Clark
430 Ortiz, Unit B
Sand City, CA 93955

Dear Mr. Clark:

Thank you for the opportunity to prepare a Phase I Historic Review of the residential property at 26500 Val Verde Rd. (APN# 015-021-020) near Carmel in Monterey County, as required by the California Environmental Quality Act (CEQA) and the County of Monterey.

Monterey County Assessor's records estimate the subject property as being constructed in 1958. The Assessor's record the wood-framed garage NW of the subject property as being constructed in 1962 (MCBP# 3194), and therefore not a part of this review.

Monterey County Deeds show the original owner of the residence was William Gamboa. Gamboa was a housing developer in the late 1950s who subsequently moved to the Madera area in the central valley. No builder has been identified. Mr. Gamboa purchased the parcel in 1950 from previous owner Howard Hatton. The land was part of the old Wm. Hatton dairy farm that once occupied the site of the Carmel Barnyard shopping center. The property was purchased by the current owner,
Mr. Roy Wirta, in 2007.

The subject property is a one-story, wood-framed example of the California Ranch House style of architecture. It is irregular in plan, and rests on a concrete foundation. The exterior wall cladding is a combination of combed wood shingles, with a brick veneer along the entryway.

The roof system is an intersecting hip and gable type with a central hipped roof having a gabled living room wing projecting toward the south, and a hip-roofed two-car garage wing projecting toward the east. The overhanging eaves have closed soffits. The roof on the south side of the main building block projects over the principal entry, forming an open porch supported by large, square wood posts.

The flush board entry door is located on the south side of the main building block where it meets the east side of the living room wing. On the rear (west) elevation, the main building block projects slightly allowing for a covered rear entry where the living room wing meets this this feature. There is one brick exterior eave wall chimney present. It is located about midway along the west elevation of the living room wing. All roof covering is in composition shingles.

Fenestration is irregular, with a combination of large fixed and banked bay windows on the south end of the living room wing, and two-part fixed and casement type industrial steel windows on all other elevations. The nonhistoric 1962 wood-framed, gable-roofed garage is found just NW of the residence.

The residence is sited back from the street on a well wooded parcel on the west side of Val Verde Drive. It is located in a wooded rural residential neighborhood of condominium complexes, single family dwellings and open farmland adjacent to the Carmel Barnyard shopping center at the mouth of Carmel Valley.

The California Environmental Quality Act (CEQA), PRC Sec. 21084.1 requires all properties fifty years of age or older to be reviewed for potential historic significance. Criteria for that significance is addressed in PRC Sec. 5024.1(a). It asks, generally, did any event of importance to the region, state or nation occur on the property ? Did anyone of great importance to the region, state or nation occupy the property during the productive period of their lives ? Does the building represent an important architectural type, period or method of construction, or is it a good example of the work of a noted architect or master-builder ? The criteria also asks if the property is likely to yield information significant to the understanding of the areas history.

The subject property is an example the California Ranch House style, which was one of the most popular and widely constructed residential designs of the pre and post WWII era, especially in mass subdivision housing. The style was derived from Early Californian and American vernacular sources, minimizing decorative detailing. They are characterized by their low, horizontal profiles, use of native materials, and informal open planning that included porches and patios affording easy access from the inside to the outside. California Ranch House style residences still abound in the residential communities Monterey County.

Eligibility for listing buildings, structures, objects, sites, and districts (i.e., resources) in the National register of Historic Places (NRHP) and California Register of Historical Resources (CRHR) rests on twin factors of *historic significance* and *integrity*. A resource must have both significance and integrity to be considered eligible. Loss of integrity, if sufficiently great, will overwhelm the historic significance a resource may possess and render it ineligible. Likewise, a resource can have complete integrity, but if it lacks significance, it must also be considered ineligible.

Integrity is determined through applying seven factors to the historic resource: location, design, setting, workmanship, materials, feeling and association. These seven can be roughly grouped into three types of integrity considerations. Location and setting relate to the relationship between the property and its environment. Design, materials, and workmanship, as they apply to historic buildings, relate to construction methods and architectural details. Feeling and association are the least objective of the seven criteria and pertain to the overall ability of the property to convey a sense of historical time and place in which it was constructed.

The subject property is in its original location, however its former rural setting has been compromised by the construction of the Carmel Barnyard shopping center to the immediate west, and a large condominium complex just south of the residence. While the house retains its original design and materials, it is one of hundreds of the same style and type found in Monterey County. The workmanship is consistent with the production of subdivision housing in the post war era. Because of the density of the adjacent development, the subject property evokes little sense of time and place or of feeling and association with the former rural nature of its setting.

No event of significance to the nation, state or region, nor any important individual has been identified with the existing property. William Gamboa, the original owner, soon left the area. No architect or builder has been identified with the design of the residence.

The subject property is one of many California Ranch House style residences constructed in Monterey County and the Carmel Valley in the post WWII era. It retains its physical integrity as constructed in 1958, however, it lacks sufficient architectural distinction or historic significance to be considered eligible for listing in the California Register or qualifying for listing on the Monterey County Historic Resource inventory. Therefore, the structure cannot be considered an historic resource as defined by CEQA.

Respectfully Submitted,

Kent L. Seavey

26500 Val Verde Road, Carmel

Photo #1. Looking NW at the south facing facade. Note attached garage to right. April. 2010.

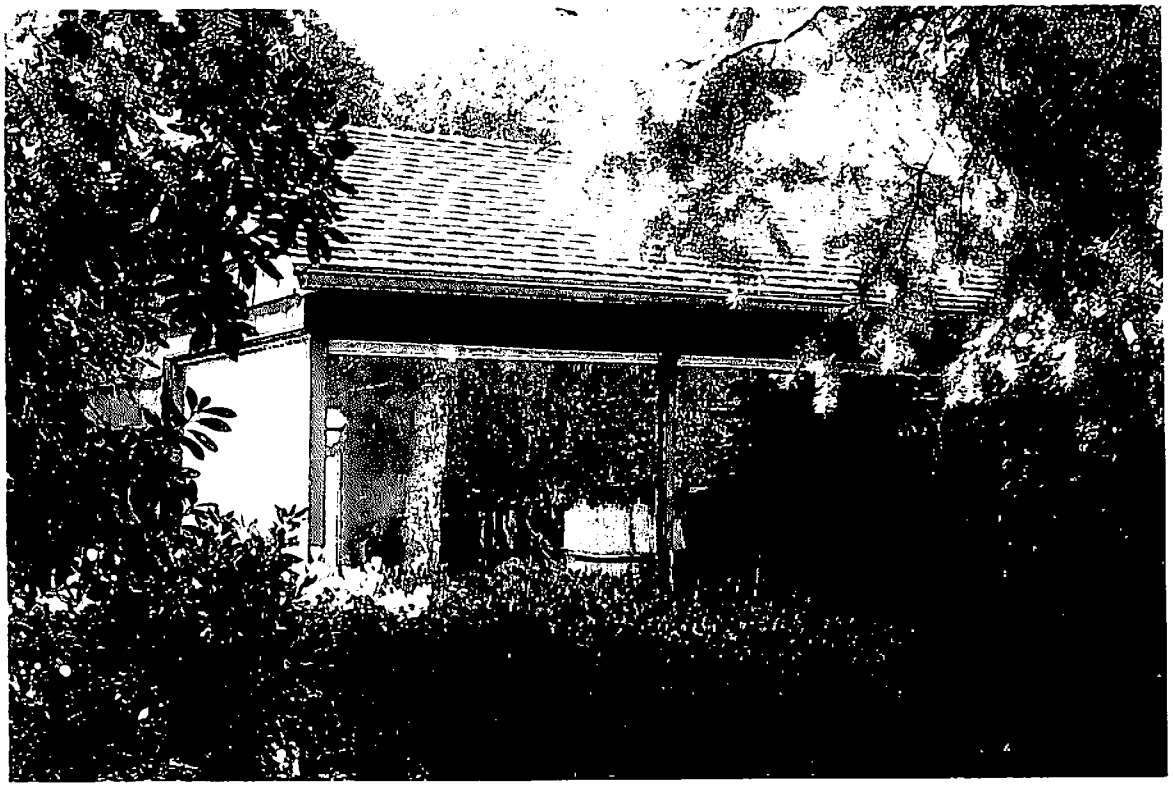


Photo #2. Looking west at the east side-elev. of the living room wing. April. 2010.

Appendix E-4

Addendum to the Phase I Historic Review

KENT L. SEAVEY

310 LIGHTHOUSE AVENUE
PACIFIC GROVE, CALIFORNIA 93950
(831)375-8739

June 24, 2016

Mr. Bob Schubert-Senior Planner
Monterey County Resource Management Agency
Planning Department
168 W. Alisal St., 2nd Floor
Salinas, CA 93901

Dear Mr. Schubert:

This letter will act as an Addendum to my Phase I Historic Review of the 1958 residential property located at 26500 Val Verde Rd. (APN# 015-021-020) near Carmel in Monterey County. The Addendum is in response to a five year review of the original historic study dated April 8, 2010 (see copy provided). Rincon Consultants, Inc., of Monterey requested some clarification on the site setting and characteristics.

The subject property is sited on the west side of Val Verde Rd. on a wooded parcel that is part of the subdivision of Lot 14, Hatton Partition of the Rancho Canada De La Segunda, originally surveyed in 1927, and further modified in July, 1950, and again reduced into into four smaller parcels April, 1956 (see plat maps provided). Zoning is (LDR/1-D-S-RAZ), Low Density Residential, (PLN#1400890.

The original 1880's Hatton Dairy complex, located west of the subject property at the mouth of Carmel Valley, including all its outbuildings were demolished for a shopping center in the late 1970s, ironically called The Barnyard. The earlier land use for the parcel under review was dairy grazing.The parcel immediately to the north of the subject property is currently in use as an organic garden, but has only been under cultivation since the 1980s.

In 2011 Past Consultants of Alameda, California prepared an Agricultural Resources Evaluation Handbook for Monterey County. The document specifically covered North Monterey County and the Salinas Valley, but not Carmel Valley. However, its themes address the types of agricultural development that occurred over time in the entire county. Under its Theme 2: Intensive Agriculture (ca. 1870-1960) it created property type descriptions including a Dairy Sub-type. Under its description of Physical Characteristics it called for " a primary residence oriented towards a primary transportation route, outbuildings including dairy barns, milk houses, cheese processing houses, tank houses, equipment barns and worker's housing". Eligibility for historic listing requires integrity, the ability of a property to convey its significance.

The Monterey County Agricultural Resource Evaluation Handbook employs the seven aspects of Integrity adopted by the National Register of Historic Places to determine integrity thresholds for its contextual themes. Under the aspect of Location, *the place where significant activities that shaped a property took place*, Intensive Farmsteads are generally located on moderate tracts of open land, near a road or rail transportation link.

The subject property, a single family residential parcel is the result of three periods of subdivision of the Hatton Dairy Farm, from 1927 to 1956 (see plat maps provided). It is just to the east of a major shopping complex that replaced all of the extant buildings of the dairy operation in the late 1970s. Small open fields exist to its north and east, but are rapidly filling up with new housing units. 26500 Val Verde Rd. lacks integrity of location.

Under the aspect of Setting, *the physical environment within and surrounding a property, including large and small scale features in which historic events took place*, would require the main house and dairy outbuildings, aspects of its natural environment and some fencing to be as intact as possible. 26500 Val Verde Rd. lacks integrity of setting.

Under the aspects of design, Materials and Workmanship, *the composition of natural and cultural elements, comprising the form and spatial organization of a property should be intact to communicate the property's historic use,* as a dairy farm. As noted above, nothing of the Hatton Dairy Farm remains. This is also true of the aspects of Materials and Workmanship, *including period construction techniques, or any vegetation similar to historic species in type, scale and visual effect that might convey historic integrity.* 26500 Val Verde Rd. lacks integrity of design, Materials and Workmanship that would connect it with the intensive farming of the former Hatton Dairy Farm.

Under the aspects of Feeling, *any evocation by the presence of physical characteristics that reflect the historic scene through the cumulative effect of setting, Design, Materials and Workmanship creates the sense of past time and place.* Association, *is the direct link between a property and the important events or persons who shaped it.* An intensive farmstead with integrity of Feeling and Association should reflect the historic persons, land use and historic events that shaped the Hatton Dairy Farm as an intensive farmstead. 26500 Val Verde Rd. lacks the integrity of Feeling and Association that would connect it with the intensive farming of the former Hatton Dairy Farm.

As there is no formal historic context statement for Carmel Valley, the existing 2013 Pebble Beach Historic Context Statement, prepared by Page & Turnbull, Inc., of San Francisco was consulted for significance criteria related to residential properties constructed in the post-WWII era, up to 1965.

The context statement includes Monterey County Review criteria, which states, in part, *"Suburban Ranch style buildings are very common in Pebble Beach and California as a whole.*

Thus, architectural significance is best reserved for buildings that demonstrate particularly strong artistic merit, or that clearly demonstrate the influence of a particular architect or builder." The residence at 26500 Val Verde Rd. does neither of these things.

The original 1958 attached garage at 26500 Val Verde Rd., is located off the NE front elevation of the residence. The detached, 1962 one-story garage/storage unit, located a little NW of the rear of the residence, is front-gabled with paired sliding barn doors, and rests on a mud-sill foundation. The exterior wall cladding is a narrow vertical flush wood siding. It's low-pitched roof slightly overhangs the eave line and is covered in composition shingles. There are two window openings, along the south side-elevation. Its design is unrelated to that of the main house, and in current use as storage. Both the single family residence and its detached garage/storage unit, which also lacks any architectural distinction, are unrelated to agricultural use (see photos provided). There are no additional ancillary structures present.

The Rincon Consultants, Inc. October 14, 2015 Peer Review of the Architectural History Evaluation of the subject property noted that "a letter report format is suitable for projects with minimal potential to impact historical resources". They also stated that "Rincon did not find any specific evidence that would reverse the conclusions outlined the cultural resources studies prepared for this project", but suggested strengthening the report to insure the study is in conformance with CEQA and the Monterey County guidelines for cultural resources. This addendum covers the questions asked by the peer reviewers. The conclusions reached in the original review remain valid (see copy provided).

Respectfully Submitted,

Kurt S. Seavey

Sources

City of Carmel-by-the-Sea
Harrison Memorial Library, History Annex biographical and historical files.

City of Monterey
Monterey Public Library, California History Room biographical and history files.

County of Monterey
Assessor's records, Monterey County Assessor's office, Salinas, CA.

Recorder's rcords, Monterey County Recorder's office, Salinas, CA.

2011 *Agricultural Resources Evaluation Handbook, Monterey County California,* Past Consultants:Alameda, CA, pp. 153-160.

2013 *Pebble Beach Historic Context Statement,* Page & Turnbull, Inc.: San Francisco, CA, pp. 116-122.

Clark, Donald
1991 *Monterey County Place Names A Geographical Dictionary,* Kestrel Press: Carmel Valley, CA, pp. 180-181.

DeVoe, Marcia
1979 *The Martins and The Hattons,* Marcia DeVoe:Carmel Valley.

Fink, Augusta
1995 *The Presence of the Past,* Chronicle Books: San Francisco, pp. 196-199.

National Park Service
1995 National Register Bulletin, *How to Apply the National Register Criteria for Evaluation,* U.S. Department of the Interior.

Seavey, Kent,
2008 Phase I Historic Review, 6540 Carmel Valley Road, Hatton Dairy Barn (Upper Hatton Ranch), Carmel Valley, Monterey County, California.

26500 Val Verde Road-Carmel Valley

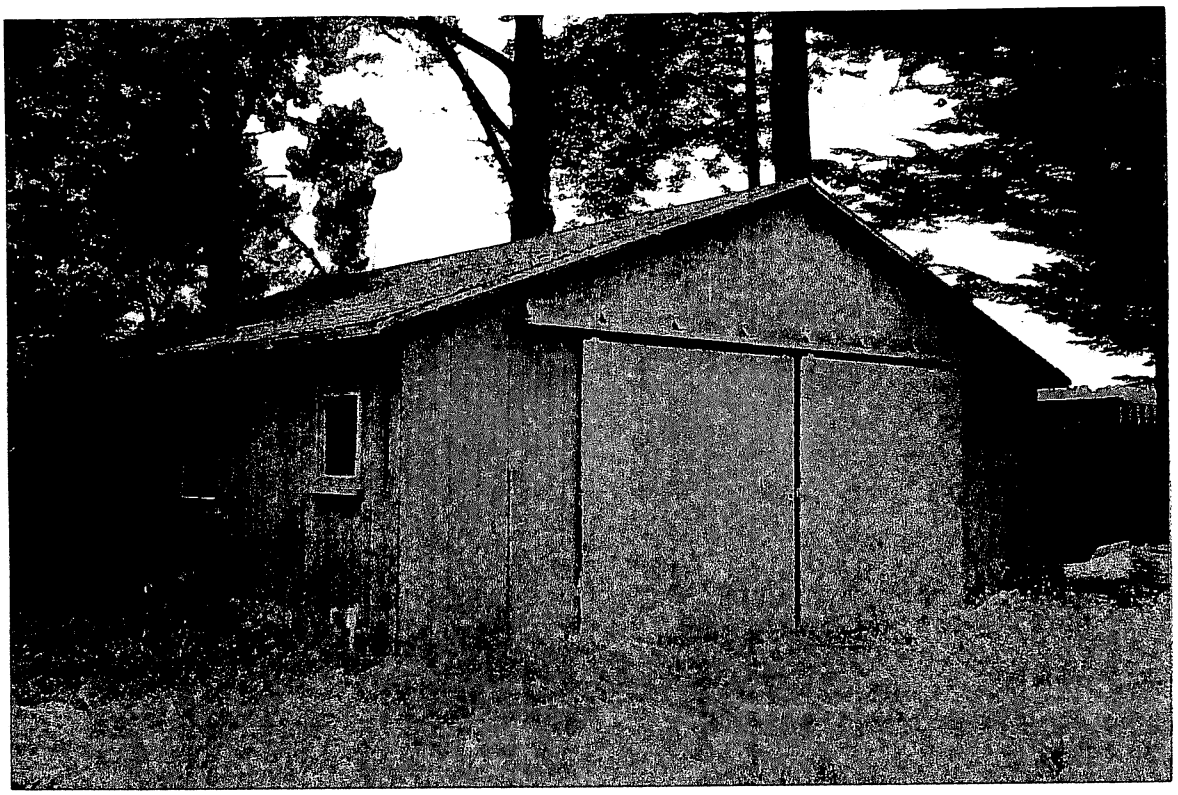
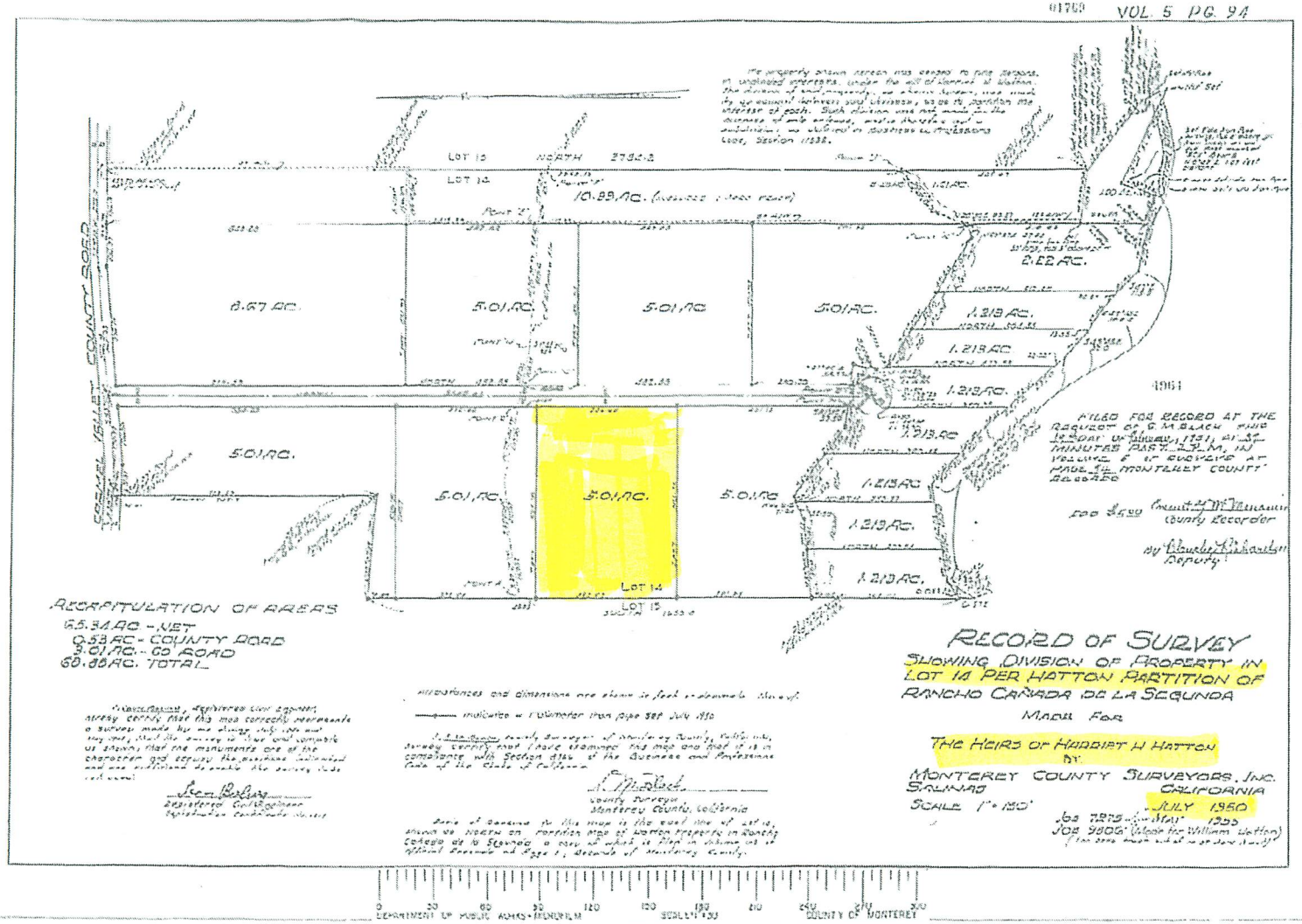


Photo #1. Looking NW at the detached 1962 garage/storage unit, June, 2016.

EXHIBIT B



1961

FILED FOR RECORD AT THE REQUEST OF C. M. BLACK THIS 18 DAY OF JANUARY, 1961, AT 34 MINUTES PAST 2 P.M., IN VOLUME 5 OF SURVEYS AT PAGE 94, MONTEREY COUNTY RECORDS

FEE $4.00 Emmett M. Williamson
County Recorder

By Blanche Richards
Deputy

RECAPITULATION OF AREAS

65.34 AC. - NET
0.53 AC. - COUNTY ROAD
9.01 AC. - GO ROAD
60.88 AC. TOTAL

I (We), the undersigned, Registered Civil Engineer, hereby certify that this map correctly represents a survey made by me (under my direction) and that (this survey is true and complete as shown) that the monuments are of the character and occupy the positions indicated and are sufficient to enable the survey to be retraced.

Leon Belser
Registered Civil Engineer
Registration Certificate No. 5161

All distances and dimensions are shown in feet and decimals thereof.

——— indicates a Tellurometer Traverse Line per July 1950

I, the undersigned, County Surveyor of Monterey County, California, hereby certify that I have examined this map and find it is in compliance with Section 8761 of the Business and Professions Code of the State of California.

C. M. Black
County Surveyor
Monterey County, California

Basis of Bearing for this map is the east line of Lot 14, shown as North on partition map of certain property in Rancho Cañada de la Segunda, a copy of which is filed in Volume 1 of Official Records at Page 1, Records of Monterey County.

RECORD OF SURVEY

SHOWING DIVISION OF PROPERTY IN LOT 14 PER HATTON PARTITION OF RANCHO CAÑADA DE LA SEGUNDA

MADE FOR

THE HEIRS OF HARRIET H HATTON

BY

MONTEREY COUNTY SURVEYORS, INC.
SALINAS CALIFORNIA

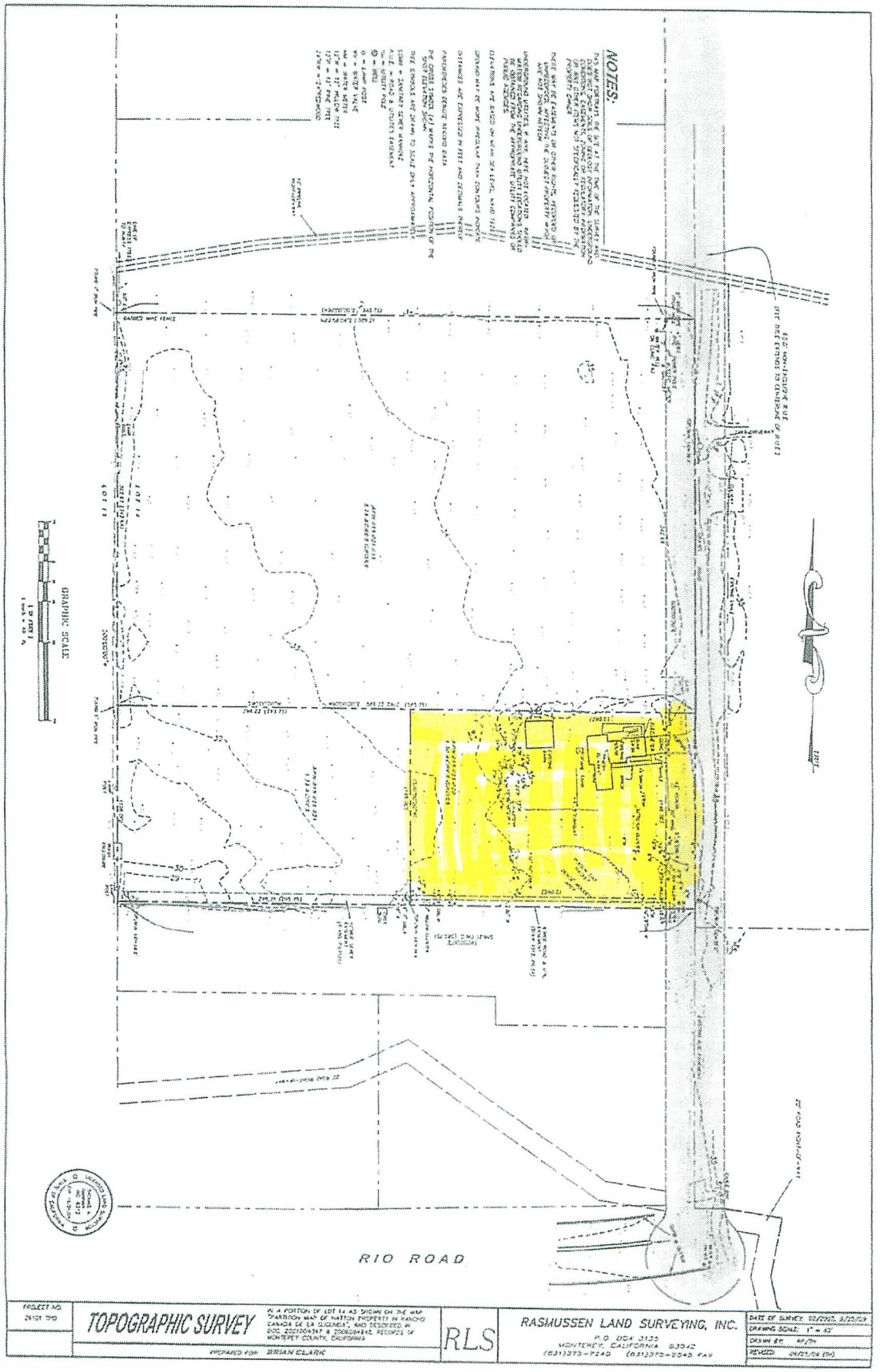
SCALE 1" = 120'

JULY 1960

Jos 7875 - MAY 1955
JOB 9806 (Block for Williams Hatton)

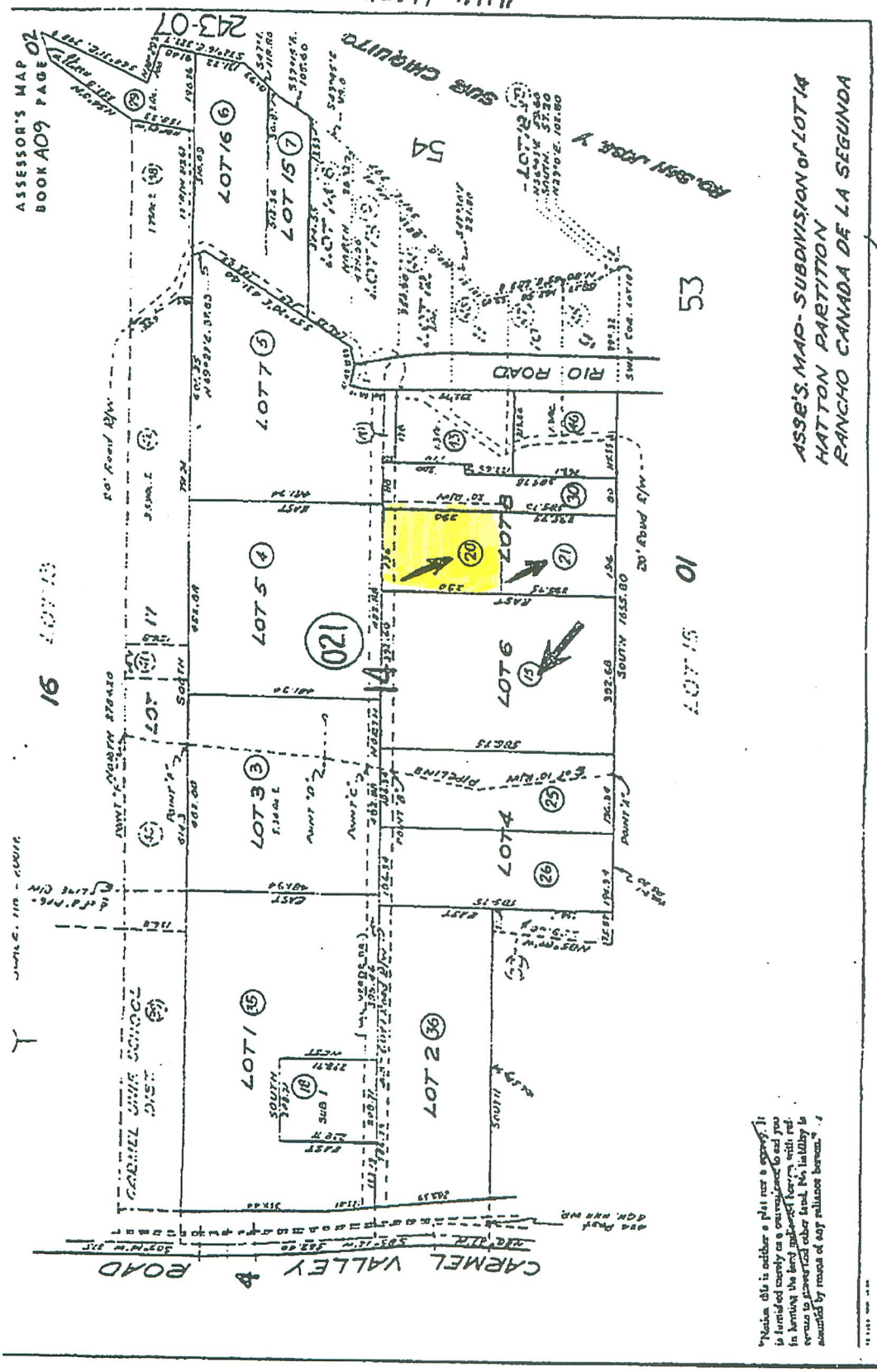
EXHIBIT B

EXHIBIT B


NOTES.
GRAPHIC SCALE
RIO ROAD
TOPOGRAPHIC SURVEY
RLS
RASMUSSEN LAND SURVEYING, INC.
P.O. BOX 3135
MONTEREY, CALIFORNIA 93942
(831)373-7240 (831)372-0540 FAX

CARMEL RIO RD., LLC

PLAT MAP



KENT L. SEAVEY

310 LIGHTHOUSE AVENUE
PACIFIC GROVE, CALIFORNIA 93950
(831)375-8739

April 8, 2010

Mr. Brian Clark
430 Ortiz, Unit B
Sand City, CA 93955

Dear Mr. Clark:

Thank you for the opportunity to prepare a Phase I Historic Review of the residential property at 26500 Val Verde Rd. (APN# 015-021-020) near Carmel in Monterey County, as required by the California Environmental Quality Act (CEQA) and the County of Monterey.

Monterey County Assessor's records estimate the subject property as being constructed in 1958. The Assessor's record the wood-framed garage NW of the subject property as being constructed in 1962 (MCBP# 3194), and therefore not a part of this review.

Monterey County Deeds show the original owner of the residence was William Gamboa. Gamboa was a housing developer in the late 1950s who subsequently moved to the Madera area in the central valley. No builder has been identified. Mr. Gamboa purchased the parcel in 1950 from previous owner Howard Hatton. The land was part of the old Wm. Hatton dairy farm that once occupied the site of the Carmel Barnyard shopping center. The property was purchased by the current owner,
Mr. Roy Wirta, in 2007.

The subject property is a one-story, wood-framed example of the California Ranch House style of architecture. It is irregular in plan, and rests on a concrete foundation. The exterior wall cladding is a combination of combed wood shingles, with a brick veneer along the entryway.

The roof system is an intersecting hip and gable type with a central hipped roof having a gabled living room wing projecting toward the south, and a hip-roofed two-car garage wing projecting toward the east. The overhanging eaves have closed soffits. The roof on the south side of the main building block projects over the principal entry, forming an open porch supported by large, square wood posts.

The flush board entry door is located on the south side of the main building block where it meets the east side of the living room wing. On the rear (west) elevation, the main building block projects slightly allowing for a covered rear entry where the living room wing meets this this feature. There is one brick exterior eave wall chimney present. It is located about midway along the west elevation of the living room wing. All roof covering is in composition shingles.

Fenestration is irregular, with a combination of large fixed and banked bay windows on the south end of the living room wing, and two-part fixed and casement type industrial steel windows on all other elevations. The nonhistoric 1962 wood-framed, gable-roofed garage is found just NW of the residence.

The residence is sited back from the street on a well wooded parcel on the west side of Val Verde Drive. It is located in a wooded rural residential neighborhood of condominium complexes, single family dwellings and open farmland adjacent to the Carmel Barnyard shopping center at the mouth of Carmel Valley.

The California Environmental Quality Act (CEQA), PRC Sec. 21084.1 requires all properties fifty years of age or older to be reviewed for potential historic significance. Criteria for that significance is addressed in PRC Sec. 5024.1(a). It asks, generally, did any event of importance to the region, state or nation occur on the property ? Did anyone of great importance to the region, state or nation occupy the property during the productive period of their lives ? Does the building represent an important architectural type, period or method of construction, or is it a good example of the work of a noted architect or master-builder ? The criteria also asks if the property is likely to yield information significant to the understanding of the areas history.

The subject property is an example the California Ranch House style, which was one of the most popular and widely constructed residential designs of the pre and post WWII era, especially in mass subdivision housing. The style was derived from Early Californian and American vernacular sources, minimizing decorative detailing. They are characterized by their low, horizontal profiles, use of native materials, and informal open planning that included porches and patios affording easy access from the inside to the outside. California Ranch House style residences still abound in the residential communities Monterey County.

Eligibility for listing buildings, structures, objects, sites, and districts (i.e., resources) in the National register of Historic Places (NRHP) and California Register of Historical Resources (CRHR) rests on twin factors of *historic significance* and *integrity*. A resource must have both significance and integrity to be considered eligible. Loss of integrity, if sufficiently great, will overwhelm the historic significance a resource may possess and render it ineligible. Likewise, a resource can have complete integrity, but if it lacks significance, it must also be considered ineligible.

Integrity is determined through applying seven factors to the historic resource: location, design, setting, workmanship, materials, feeling and association. These seven can be roughly grouped into three types of integrity considerations. Location and setting relate to the relationship between the property and its environment. Design, materials, and workmanship, as they apply to historic buildings, relate to construction methods and architectural details. Feeling and association are the least objective of the seven criteria and pertain to the overall ability of the property to convey a sense of historical time and place in which it was constructed.

The subject property is in its original location, however its former rural setting has been compromised by the construction of the Carmel Barnyard shopping center to the immediate west, and a large condominium complex just south of the residence. While the house retains its original design and materials, it is one of hundreds of the same style and type found in Monterey County. The workmanship is consistent with the production of subdivision housing in the post war era. Because of the density of the adjacent development, the subject property evokes little sense of time and place or of feeling and association with the former rural nature of its setting.

No event of significance to the nation, state or region, nor any important individual has been identified with the existing property. William Gamboa, the original owner, soon left the area. No architect or builder has been identified with the design of the residence.

The subject property is one of many California Ranch House style residences constructed in Monterey County and the Carmel Valley in the post WWII era. It retains its physical integrity as constructed in 1958, however, it lacks sufficient architectural distinction or historic significance to be considered eligible for listing in the California Register or qualifying for listing on the Monterey County Historic Resource inventory. Therefore, the structure cannot be considered an historic resource as defined by CEQA.

Respectfully Submitted,

Kent L. Seavey

26500 Val Verde Road, Carmel

Photo #1. Looking NW at the south facing facade.
Note attached garage to right. April. 2010.

Photo #2. Looking west at the east side-elev. of the
living room wing. April. 2010.

Appendix E-5

Cultural Reports Peer Review

Rincon Consultants, Inc.
437 Figueroa Street, Suite 203
Monterey, California 93940

831 333 0310
FAX 333 0340

info@rinconconsultants.com
www.rinconconsultants.com

October 14, 2015
Rincon Project No. 14-00187

Bob Schubert, Senior Planner
Monterey County Resources Management Agency
Planning Department
168 W. Alisal St., 2nd Floor
Salinas, California 93901

Subject: **Peer Review of an Archaeological Technical Report and Architectural History Evaluation for the Carmel Rio Road Subdivision Project, Unincorporated Monterey County, California**

Dear Mr. Schubert:

This letter summarizes the results of a peer review of two cultural resource documents prepared for the property located at 15 and 26500 Val Verde Drive, within the Carmel Valley Master Plan Area, in unincorporated Monterey County, California. The project site lies approximately 0.7 mile southeast of the City of Carmel-by-the-Sea (outside of the City's sphere of influence), approximately 0.3 mile east of Highway 1, and approximately 0.2 mile south of Carmel Valley Road (subject property). The project site is composed of three parcels (Assessor's Parcel Numbers [APN] 015-021-020-000, 015-021-021-000, & 015-021-015-000).

This peer review was conducted as part of the environmental analysis being conducted in conformance with the California Environmental Quality Act (CEQA) by the County of Monterey. The purpose of the review is to determine whether the cultural resources analyses completed for the project site are adequate for the purposes of preparing an Environmental Impact Report (EIR). This letter summarizes the results of a peer review of the following two cultural resources reports prepared for the subject property:

- *Preliminary Archaeological Reconnaissance for Assessor's Parcels 015-021-015, 015-021-020 and 015-021-021 in Carmel, Monterey County, California.* Prepared by Mary Doane and Gary Breschini of Archaeological Consulting (Doane and Breschini 2007).
- *Phase I Historic Review, 26500 Val Verde Road, Carmel, Monterey County, California.* Prepared by Ken Seavey (Seavey 2010).

The peer review was conducted by Cultural Resources Principal Investigator Christopher Duran, M.A., RPA, who meets the Secretary of the Interior's *Professional Qualification Standards* (PQS) for historic and prehistoric archaeology (National Park Service 1983), and Senior Architectural Historian Shannon Carmack, B.A. who meets the PQS for architectural history and history.

Methods

The analysis entailed review of the both cultural resources documents with regard to methods, findings, and the potential for the project to impact significant historical and or archaeological resources as defined in CEQA and the *State CEQA Guidelines*. No site visits were conducted by Rincon cultural resources staff; nor was any supplemental archival research, Native American or historical group coordination or California Historical Resources Inventory records search conducted.

Archaeological Report Peer Review

Doane and Breschini's (2007) *Preliminary Archaeological Reconnaissance for Assessor's Parcels 015-021-015, 015-032-020, and 015-021-021 in Carmel, Monterey County, California* follows a negative letter report format with the results of the records search, methodology, findings, and management recommendations. The letter report format does not include a prehistoric or historic context. This format is common for negative Phase I surveys in many areas; however, reports prepared following the Office of Historic Preservation's (OHP; 1990) *Archaeological Resource Management Reports (ARMR): Recommended Contents and Format* typically provide more detail.

The methodology for the field investigation does not provide specific details for the field survey. The report states that the areas "reasonably expected to contain visible cultural resources" were inspected as part of the reconnaissance. The document does not indicate what or where these inspected areas are specifically within the project site. Although much of the site consists of agricultural fields, this does not preclude the area from containing cultural resources. The report also does not indicate if the inspected areas were surveyed using transects which may help to clarify the intensity of the field survey. The report also indicates that a portion parcel 021 is covered with fill material, but fails to indicate what percentage of the parcel consists of fill or how it was determined that the soils consist of fill. This information would also help indicate which areas were inspected during the field investigation.

Doane and Breschini also state that two cultural resources were noted in the research area (1 km) surrounding the project site, but did not identify what types of resources those might be. One resource was noted to be within 300 meters of the project site. This information may assist with determining the archaeological sensitivity of the area. For example, should those resources be prehistoric village sites, the archaeological sensitivity of the area would be greatly increased.

The Doane and Breschini study is approximately eight years old (completed in 2007). Areas are often resurveyed every 5 years as surface conditions change over time and may expose new resources. However, considering that the majority of the project consists of agricultural fields, an argument can be made that the field conditions would have had minimal changes over the eight-year period.

Recommended Changes

To bolster the argument of no impact to archaeological resources, Rincon recommends the following actions to further provide clarity and certainty in this finding:

- Indicate which areas of the project site were inventoried on a map and in the text, as well as which areas and percentage of the project site is covered by fill material.

- Add more details concerning the field methods (e.g., were those areas inspected for cultural resources surveyed using transects?). What was the transect spacing?
- Provide photos of the existing condition of the site.
- List the properties identified during the records search.
- Provide recommendations of archaeological sensitivity based on type and location of nearby resources.

Based on the information provided in *Preliminary Archaeological Reconnaissance for Assessor's Parcels 015-021-015, 015-032-020, and 015-021-021 in Carmel, Monterey County, California* (Doane and Breschini 2007), it is unclear if the field methods used for the investigation meet current professional standards. Additional details are needed to help support the conclusions in the report of no impact to archaeological resources.

Architectural History Peer Review

Ken Seavey's (2010) *Phase I Historic Review, 26500 Val Verde Road, Carmel, Monterey County, California* is a brief letter report that summarizes the results of a pedestrian survey and archival research, which concludes that the single family residence is not eligible for historic designation. Although a letter report format is suitable for projects with minimal potential to impacts historical resources, the methods and evidence used to support the findings should be strengthened to ensure the study is in conformance with CEQA and County of Monterey guidelines for cultural resources.

The site setting and characteristics should be clarified. The subject property appears to be a single-family residence, situated on an agricultural lot that was historically used for farming activities. However the letter lacks supporting information about the history of the property and its function to adequately characterize the property and setting. The letter describes an associated garage, but provides few additional details on the property as a whole. Further, the property does not appear to be within a subdivision; however the author describes the residence as a typical California Ranch-style home that was common amongst post-war tracts. If appropriate, the property should be evaluated for its significance as an agricultural-related resource, as well as any other potential historic themes identified through a developed historic context. It is unknown if there are any additional buildings or structures on the site; given the presumed agricultural function of the property it would be expected that additional ancillary structures are present. The property should be evaluated for consideration at the local level of significance in additional to its significance under the CRHR criteria.

The letter is now five years old, which in terms of cultural resources analysis makes the information out of date. The California Office of Historic Preservation (OHP) notes that surveys should be updated every 5 years to consider properties that may have achieved significance since the survey was originally conducted and to incorporate resources that were initially overlooked. For this project, the associated garage was omitted from evaluation because it had not reached the 50 year eligibility threshold. It is doubtful that the garage would be historically significant or change the evaluation findings for the residence in any way, but it is a technical oversight that could be identified as a flaw in the analysis. It is recommend that any evaluation update to the property include the garage as well as any other buildings and or structures on the property that are older than 50 years of age.

Recommended Changes

To bolster the argument of no impact to historical resources, Rincon recommends the following actions to further provide clarity and certainty in this finding:

- Include references for archival research so that the primary source data collected can easily be verified.
- Update the historic analysis to include an evaluation of the residence and garage as single property, within the appropriate historic contexts. Provide additional information about the historic and setting characteristics. Confirm the presence or absence of additional structures.
- Prepare Department of Parks and Recreation (DPR) forms in accordance with the *County of Monterey Guidelines for Historic Assessments* (County of Monterey 2008).

Conclusions

In summary, Rincon did not find any specific evidence that would reverse the conclusions outlined in the cultural resource sturdies prepared for this project; however the methodologies and evidence provided in the documents do not strongly support the findings. Both studies were conducted at a cursory "due diligence" level and did not employ the methodologies and level of analysis to substantiate a CEQA-level analysis. This lack of supporting evidence to validate the administrative record could be called into question during the environmental review process. Rincon strongly recommends conducting supplemental studies to update the existing findings and conclude the cultural resources analysis for the project.

Sincerely,
RINCON CONSULTANTS, INC.

Christopher Duran, M.A., RPA
Principal Investigator, Cultural Resources

Shannon Carmack, B.A.
Senior Architectural Historian

References

California Office of Historic Preservation
1990 *Archaeological Resource Management Reports (ARMR) Guidelines: Recommended Contents and Format*. Electronic document accessed September 22, 2015. Online at: http://ohp.parks.ca.gov/pages/1054/files/armr.pdf

1995 Instructions for Recording Historical Resources. Electronic document accessed September 22, 2015. Online at: http://www.scic.org/docs/OHP/manual95.pdf

County of Monterey
2008 *Guidelines for Historic Assessments*. On file, County of Monterey Planning Department. Electronic document accessed September 22, 2015. Online at http://www.co.monterey.ca.us/planning/cca/HRRB/Guidelines_For_Historic_Assessment_Updated_090908.pdf

National Park Service
1983 Archaeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines. Electronic document accessed May 21, 2013. Online at http://www.nps.gov/history/local-law/Arch_Standards.htm.

Seavey, Ken
2010 *Phase I Historic Review, 26500 Val Verde Road, Carmel, Monterey County, California.* Letter on file with the County of Monterey, California.

Appendix E-6

Cultural Reports Peer Review Addendum

Rincon Consultants, Inc.
437 Figueroa Street, Suite 203
Monterey, California 93940

831 333 0310
FAX 333 0340

info@rinconconsultants.com
www.rinconconsultants.com

July 22, 2016
Rincon Project No. 14-00187

Bob Schubert, Senior Planner
Monterey County Resources Management Agency
Planning Department
168 W. Alisal St., 2nd Floor
Salinas, California 93901

Subject: **Peer Review Addendum regarding Archaeological Technical Report and Architectural History Evaluation for the Carmel Rio Road Subdivision Project, Unincorporated Monterey County, California**

Dear Mr. Schubert:

On October 14, 2015, Rincon submitted a memorandum to you presenting the results of a peer review of two cultural resource documents prepared for the property located at 15 and 26500 Val Verde Drive, within the Carmel Valley Master Plan Area, in unincorporated Monterey County, California.

The peer review memorandum regarded the following two cultural resources reports:

- *Preliminary Archaeological Reconnaissance for Assessor's Parcels 015-021-015, 015-021-020 and 015-021-021 in Carmel, Monterey County, California.* Prepared by Mary Doane and Gary Breschini of Archaeological Consulting (Doane and Breschini 2007).
- *Phase I Historic Review, 26500 Val Verde Road, Carmel, Monterey County, California.* Prepared by Ken Seavey (Seavey 2010).

The peer review was conducted by Cultural Resources Principal Investigator Christopher Duran, M.A., RPA, who meets the Secretary of the Interior's *Professional Qualification Standards* (PQS) for historic and prehistoric archaeology (National Park Service 1983), and Senior Architectural Historian Shannon Carmack, B.A. who meets the PQS for architectural history and history.

Archaeological Report (Doane and Breschini 2007)

Rincon recommended the following clarifications to support the conclusions in the report of no impact to archaeological resources:

- Indicate which areas of the project site were inventoried on a map and in the text, as well as which areas and percentage of the project site is covered by fill material.
- Add more details concerning the field methods (e.g., were those areas inspected for cultural resources surveyed using transects?). What was the transect spacing?
- Provide photos of the existing condition of the site.
- List the properties identified during the records search.

- Provide recommendations of archaeological sensitivity based on type and location of nearby resources.

Rincon Cultural Resources Program Manager Kevin Hunt spoke with Gary Breschini of Archaeological Consulting on July 19, 2016. Dr. Breschini confirmed the following regarding the archaeological study:

- Archaeologist Mary Doane conducted the survey. She worked for Archaeological Consulting for 25 years with additional time at State Parks.
- For a parcel this size (small) they conduct tight zig-zig transects and thoroughly cover the entire site.
- They did survey the entire project site and if something [i.e., an archaeological resource] was there they would have found it.
- He believes the project site is not sensitive but included standard unanticipated discovery mitigation language because he has seen cases in the region where burials are found in places with no archaeological materials present on the surface.
- Archaeological Consulting is no longer under contract to the project applicant and will not prepare a revised report or memorandum that responds to the peer review.

Based on these responses Rincon concludes that the project site was adequately surveyed to current professional standards and that the report's findings of no impact to archaeological resources are correct and defensible. Rincon recommends no additional archaeological resources work for the project beyond the implementation of mitigation measures to be identified in the project environmental impact report (EIR).

Architectural History Report (Seavey 2010)

Rincon's peer review memorandum recommended the following actions to bolster the argument of no impact to historical resources:

- Include references for archival research so that the primary source data collected can easily be verified.
- Update the historic analysis to include an evaluation of the residence and garage as single property, within the appropriate historic contexts. Provide additional information about the historic and setting characteristics. Confirm the presence or absence of additional structures.
- Prepare Department of Parks and Recreation (DPR) forms in accordance with the *County of Monterey Guidelines for Historic Assessments* (County of Monterey 2008).

Kent L. Seavey prepared an addendum to the Phase I historic review dated June 24, 2016, that responded to Rincon's peer review memorandum. Seavey's 2016 addendum presented the requested additional information about the historic and setting characteristics as well as the requested references. Based on the content of Seavey's addendum, Rincon finds that the peer review comments were adequately addressed and that the findings of Seavey's 2010 report are correct and defensible. No additional architectural history work is recommended.

In summary, based on the responses to Rincon's cultural resources peer review memorandum, the results of the archaeological and architectural history reports are accepted.

Sincerely,
RINCON CONSULTANTS, INC.

Christopher Duran, M.A., RPA
Principal Investigator, Cultural Resources

Shannon Carmack, B.A.
Senior Architectural Historian

Appendix F

Geology and Soils Reports

Appendix F-1

Geologic Hazards Study

GEOLOGICAL HAZARDS STUDY
VAL VERDE RESIDENTIAL DEVELOPMENT
VALVERDE DRIVE
CARMEL, CALIFORNIA

January 2010

Prepared for
Mr. Brian Clark
430 Ortiz Avenue, #B
Sand City, California 93955

Prepared by

Earth Systems Pacific
400 Park Center Drive, Suite 1
Hollister, California

Copyright © 2010

Earth Systems Pacific

400 Park Center Drive, Suite 1
Hollister, California 95023

(831) 637-2133 • FAX (831) 637-0510
E-mail: esp@earthsys.com

January 4, 2010 File No.: SH-11122-GA

Mr. Brian Clark
430 Ortiz Avenue, #B
Sand City, CA 93955

PROJECT: VAL VERDE DRIVE RESIDENTIAL DEVELOPMENT
VAL VERDE DRIVE
CARMEL, MONTEREY COUNTY, CALIFORNIA

SUBJECT: **Geologic Hazards Study**

REFERENCE: Proposal for a Geologic Hazards Study, Val Verde Residential Development, Val Verde Drive, Carmel, California, by Earth Systems Pacific, dated October 1, 2009.

Dear Mr. Clark:

In accordance with your authorization of the above referenced proposal, we are submitting herewith the results of our Geological Hazards Study for the planned residential development on Val Verde Drive in Carmel, California. This report is based upon the results of our review of geologic maps, literature, consultant reports, aerial photographs and geologic mapping. In the report we describe the general geologic characteristics of the site, identify potential geologic hazards, and provide guidance for site development. Three copies of this report have been furnished for your use.

We appreciate the opportunity to have provided geologic services for this project and look forward to working with you again in the future. If there are any questions concerning this report, please do not hesitate to contact the undersigned.

Sincerely,

Earth Systems Pacific

Brett Faust
Engineering Geologist
EG 2386

PROFESSIONAL GEOLOGIST
BRETT D. FAUST
No. 2386
CERTIFIED
ENGINEERING
GEOLOGIST
STATE OF CALIFORNIA

Distribution: 3 to Addressee

Document No. 1001.509.GEO

TABLE OF CONTENTS

1.0 INTRODUCTION....1
Planned Development....1
Purpose and Scope of Work....1
Site Setting....2
2.0 FIELD METHODOLOGY....2
Site Reconnaissance....2
Aerial Photographs....3
3.0 GEOLOGY....3
Geologic Setting....3
Geologic Site Conditions....4
Groundwater....4
Faulting....5
Landsliding....5
4.0 ANALYSIS AND CONCLUSIONS....5
Earthquake History....5
Primary Seismic Hazards....5
Secondary Earthquake Effects....7
Static/Seismic Slope Stability....8
5.0 SUMMARIZED GEOLOGIC CONCLUSIONS AND RECOMMENDATIONS....8
6.0 CLOSURE....8
REFERENCES....10
AERIAL PHOTOGRAPHS....11

APPENDIX A

Vicinity Map
Site Geologic Map
Regional Geologic Map
Regional Fault Map

1.0 INTRODUCTION

Planned Development

This report presents the results of our geologic hazards study for the proposed Val Verde Drive residential development in Carmel, California. The site consists of three contiguous parcels which encompass a square-shaped area of approximately 8-acres on the west side of Val Verde Drive. The location of the site is shown on Figure 1, Vicinity Map (see Appendix A). Plans for the development were not available at the time of this report.

Purpose and Scope of Work

This study has been conducted to evaluate and define the geologic/seismic conditions and potential geologic/seismic hazards associated with proposed residential development of the site. The scope of our work is intended to satisfy the requirements of California Division of Mines and Geology (CDMG) Note 42: Guidelines to Geologic/Seismic Reports. The scope of work for this geologic hazards study included review of available geologic reports and maps, review of stereo aerial photo pairs covering the site and its immediate vicinity, and review of a Preliminary Geologic Report (Foxx, 1988) and Geotechnical Engineering Report and Liquefaction Study (Buena, 2007), evaluation of the data collected, and preparation of this report.

It is our intent that this report be used exclusively by the client to form the geologic/seismic basis of the design of the project as described herein, and in the preparation of plans and specifications. Application beyond this intent is strictly at the user's risk. If future property owners wish to use this report, such use will be allowed to the extent that the report is applicable, provided the future user is bound by the same contractual conditions as the original client or by conditions that may be applicable at the time of the report's use.

This report does not address issues in the domain of contractors such as, but not limited to, site safety, loss of volume due to stripping of the site, shrinkage of soils during compaction, excavatability, dewatering, shoring, temporary slope angles, construction methods, etc. Analyses of the site for soils engineering parameters, radioisotopes, asbestos (either naturally occurring or man-made), hydrocarbons, mold potential, or chemical properties are beyond the scope of this study. Ancillary features such as access roads, fences, light and flag poles, signage, and fill soils are all not within our scope and are also not addressed.

In the event that there are any changes in the nature, design, or location of improvements, or if any assumptions used in the preparation of this report prove to be incorrect, the conclusions and recommendations contained herein shall not be considered valid unless the changes are reviewed and the conclusions of this report are modified or verified in writing by the project geologist. The criteria presented in this report are considered preliminary until such time as any peer review or review by any jurisdiction has been completed, conditions have been observed by the geologist in the field during construction, and the recommendations have been verified as appropriate, or modified in writing by the project geologist.

Site Setting

The site is located on the Monterey, California, 7½-minute topographic quadrangle (U.S. Geological Survey, 1983) at approximate latitude 36.5401N and longitude121.5401W. Regionally, the site is located on the floor of the Carmel Valley. A residence is present on the southeast site corner. Commercial properties are present on the west and rural residential and agricultural properties are present in the remaining adjacent areas. The site is essentially flat and lies at an elevation of approximately 30 feet.

2.0 FIELD METHODOLOGY

Site Reconnaissance

On November 11, 2009, a site reconnaissance and geologic mapping of the subject property were performed by an Earth Systems Pacific geologist. The purpose of our reconnaissance was to observe exposures of subsurface materials at or near the site and to identify existing or potential geological hazards. The location of the site is shown on a Vicinity Map in Appendix A.

The site is located in the Carmel Valley approximately 1.5 miles east of the mouth of the Carmel River and the Pacific Ocean. It is situated atop an older river terrace about 0.25 miles north of the active Carmel River channel. The site is drained by sheet-flow towards the southwest site corner. There are no significant slopes on or adjacent to the site. At the time of our reconnaissance the site was disked and there were various shrubs and trees along the north and south site boundaries. Val Verde Drive is present along the eastern site boundary and developed commercial properties are present on the west.

Aerial Photographs

We reviewed a pair of stereoscopic aerial photographs available in our files that were taken in 1950 showing the site and its vicinity. The site and surrounding areas are used to grow row-crops. The inboard edge of the river terrace crosses the southwest site corner and blends with native ground surface immediately to the west. We also reviewed historic imagery available through Google Earth. Imagery was available for the years 1998, 2002, 2003, 2004, 2005, 2007 and 2009. These images show the site in agricultural use with a residence on the southeast site corner. There was no significant change to the site between 1998 and 2009.

3.0 GEOLOGY

Geologic Setting

Regional Geology

The site is located within the geologically complex Coast Ranges Geomorphic Province of central coastal California. Discontinuous northwest-southeast trending mountain ranges, valleys and faults formed by tectonic, mountain-building processes characterize the province.

The predominant structural feature in the California Coast Ranges is the San Andreas fault, which is the structural boundary the Pacific and North American tectonic plates. The subject site lies west of the San Andreas fault with basement rocks of Salinian Block metamorphic and granitic rocks of Paleozoic and Cretaceous age. The Salina basement rocks have been detached and moved northward along the San Andreas Fault system to their present position (Hall, 1991). The basement rocks are overlain by younger late Cretaceous to Tertiary, and Quaternary age marine and terrestrial sedimentary rocks with volcanic rocks locally present. The regional site geology is shown on a Regional Geologic Map in Appendix A.

Local Geology

Based on Clark et al. (1997), the site is underlain by older flood-plain deposits (Qof) of Holocene age with younger flood-plain deposits (Qyf) of Holocene age on the southwest site corner. These deposits are described as unconsolidated, relatively fine-grained, heterogeneous deposits of sand and silt with common thin layers of clay. A Site Geologic Map is included in Appendix A.

Geologic Site Conditions

The site is located on a flood-plain terrace on the northern banks of the Carmel River. The terrace extends northward to the valley margin, and approximately 3,000 feet and 4,500 feet to the east and west, respectively. Buena (2007) described soil conditions at the site. For their study, nine borings were drilled on the site to maximum depths of 50 feet. Reported soil types encountered in the borings consisted of sands with some local gravel zones. It was concluded that the potential for liquefaction to occur at depths greater than 23 feet beneath the site is likely.

Groundwater

At the time of Buena's subsurface investigation, groundwater was encountered at a depth of about 23 feet. According to Foxx (1988), groundwater was encountered at depths between 13 feet and 25 feet in several exploratory borings drilled in the site vicinity in connection with their study. They noted that the groundwater table appeared to be inclined towards the Carmel River.

Faulting

The site is located within the seismically active central California Coast Ranges geomorphic province, but is not located in a State Earthquake Fault Zone (Hart and Bryant, 1997). The major active faults capable of producing large magnitude events and that have a high seismic activity rate recognized in the region are the San Andreas, Hayward and San Gregorio faults. Other active faults in the site region include the Zayante-Vergeles, Monterey Bay-Tularcitos, and Calaveras faults (see Regional Fault Map in Appendix A, for the location of these faults relative to the site). Based on Clark et al. (1997) there are no faults mapped on or adjacent to the site.

Landsliding

Based on Clark et al. (1997), there are no landslides mapped on or adjacent to the site. In the site vicinity, large landslide complexes are present about 2,000 feet south of the site on the valley wall. Based on their distance from the site, these landslides do not appear to be capable of impacting the site. Additionally, there was no evidence of landsliding on or adjacent to the site in the 1950 aerial photographs reviewed and we found no evidence of landslides on the site during our reconnaissance.

ANALYSIS AND CONCLUSIONS

Earthquake History

In assessing the seismic hazards for a given area, it is useful to examine records of historic local earthquakes. This information can be extrapolated to estimate the recurrence rate of local earthquakes. A number of strong earthquakes that have damaged man-made structures have occurred on the active faults in the central California region within the last 200 years. Especially notable are the 1836 6.4M (estimated magnitude, M) San Juan Bautista earthquake; the 1838 7.4M San Francisco to San Juan Bautista earthquake; the 1865 6.6M Santa Cruz Mountains earthquake; the 1868 7.0M Hayward earthquake; the 1906 8.3M San Francisco earthquake; the 1926 6.1M Monterey Bay doublet; the August 6, 1979 5.8M Coyote Lake earthquake; the April, 24 1984 6.2M Morgan Hill (Halls Valley) earthquake; and the October 18, 1989 7.1M Loma Prieta earthquake. According to the Working Group on California Earthquake Probabilities (2003), there is a 62 percent probability that a 6.7M or greater earthquake will occur between 2002 and 2031 in the region.

The Northern California Earthquake Data Center (NCEDC) catalog was used to search for earthquakes that have affected the site in historic times. In addition to those mentioned above, many minor to moderate earthquakes have affected the site region with most having magnitudes of less than about 5.0M. Within a 100 kilometer (63 mile) radius of the site, 33 earthquakes with reported magnitudes of 5.0 and greater for the years 1910 through the date of this report are listed. The largest magnitude earthquake within our search radius was the 7.1M Loma Prieta earthquake that occurred about 55 km (34 miles) to the north on October 18, 1989. The closest historic earthquake with a magnitude greater than about 5.0 was a 5.1M earthquake that occurred about 18 km (11 miles) to the south on January 23, 1984.

Primary Seismic Hazards

Surface Ground Rupture

Surface ground rupture generally occurs at sites that are traversed by or that lie very near a causative fault. The site is not located in a State Earthquake Fault Zone, and no faults considered to be active lie on or adjacent to the site. The closest State-mapped active faults to the site are the Monterey Bay-Tularcitos and San Gregorio (south) faults.

In the site vicinity, California Geological Survey (CGS) Fault Evaluation Report FER-167 (CGS,

1985) shows east-west trending parallel traces of the "Tularcitos" fault north and south of the subject site. It is noted that there is no evidence of recent faulting in late Holocene alluvium near the site. According to Probabilistic Seismic Hazard Assessment for the State of California (CGS, 1996), a concealed uncertain fault is mapped north of the site that has roughly the same trend as the fault shown in FER-167 (CGS, 1985). The approximate location of this fault is shown on Regional Geologic Map in Appendix A.

Based on our reconnaissance and aerial photograph review, we found no evidence for the presence of faulting on or adjacent to the site. The potential for surface ground rupture at the site is considered low.

Ground Shaking

The site is in a region of generally high seismicity and has the potential to experience strong ground shaking from earthquakes on regional and/or local causative faults.

The seismic design parameters for the site per Chapter 16 of the California Building Code (2007 Edition) are as follows. The values were determined utilizing the USGS Earthquake Hazards Program Earthquake Ground Motion Parameter Java Application and the NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures.

Site Class = D
Short Term Spectral Response Parameter, S_s = 1.027g
1 Second Spectral Response Parameter, S_1 = 0.643g
Site Coefficient, F_a = 1.0
Site Coefficient, F_v = 1.5

Additionally, a deterministic seismic hazard analysis (DSHA) was performed for the site. A deterministic approach evaluates each active fault within the region that may be reasonably expected to generate strong ground shaking at the site. The estimated mean peak ground accelerations presented in Table 1 below are based on the estimated upper bound earthquake at the near point of the fault. The DSHA was performed using the computer program EQFAULT (Blake, 2000) utilizing the attenuation relationship by Boore et al. (1997) for National Earthquake Hazard Reduction Program site class D to estimate the mean peak horizontal ground acceleration at the site. Earthquake magnitude (M_W) and slip rate parameters are based on 2002 updates to Probabilistic Seismic Hazard Assessment for the State of California (CGS, 1996; 2002). Based on the deterministic analysis, it

appears that the greatest site peak ground acceleration will result from an earthquake on the Monterey Bay – Tularcitos or San Gregorio (south) faults.

TABLE 1
ESTIMATES OF PEAK GROUND ACCELERATION
VAL VERDE DRIVE RESIDENTIAL DEVELOPMENT
CARMEL, CALIFORNIA

Fault	Nearest Point (mi/km)	Maximum Magnitude (M_W)	Est. Mean Peak Ground Acceleration (g)	Slip Rate (mm/yr)	Fault Type
Monterey Bay - Tularcitos	3.6/5.8	7.3	0.594	0.5	B
San Gregorio South	5.2/8.3	7.0	0.391	3.0	B
Rinconada	12.4/19.9	7.5	0.260	1.0	B
San Gregorio North	22.9/36.9	7.2	0.164	7.0	B
Zayante – Vergeles	24.9/40.1	7.0	0.119	0.1	B
Hosgri	28.8/46.4	7.5	0.138	2.5	B
San Andreas	29.3/47.1	7.0	0.112	17.0	A
Calaveras South	34.4/55.3	5.8	0.068	15.0	B

Secondary Earthquake Effects

Liquefaction

Soil liquefaction is the loss of soil strength during a significant seismic event. It occurs primarily in saturated, loose to medium-dense, fine to medium grained sands and sandy silts. Common types of liquefaction-related ground failure include differential settlement and lateral spreading. The site lies

within an area deemed to have a moderate susceptibility for liquefaction (Monterey County, 2001). According to Buena Geotechnical Services (2007), soils below a depth of 23 feet at the site are likely to liquefy in the event of a nearby large magnitude earthquake. Overexcavation and recompaction of soils in the building pad areas and construction of mat or post-tensioned foundations were recommended by Buena (2007) to mitigate liquefaction induced settlement.

Seismically Induced Settlement

Seismically-induced settlement of sufficient magnitude to cause structural damage is normally associated with poorly consolidated, predominantly sandy soils or variable consolidation characteristics within the building areas. Buena (2007) noted loose soil conditions and slightly clayey silty fine sands at the site. It is possible that these soils are susceptible to seismically induced settlement. However, Buena's (2007) recommendations include a substantial amount of grading and recompaction, and recommended foundation types which would appear to lower possible seismically induced settlement susceptibility to acceptable levels.

Static/Seismic Slope Stability

The site is essential flat and there are no significant slopes on or adjacent to the site. According to Monterey County hazard maps (2001), the site lies within an area deemed to have a low susceptibility to earthquake induced landslides. Therefore, the potential for landslides to impact the subject site is considered to be very low

5.0 SUMMARIZED GEOLOGIC CONCLUSIONS AND RECOMMENDATIONS

Based on our evaluation, the site will be subject to strong earthquake-induced ground shaking and there is the potential for liquefaction to occur at the site. To minimize liquefaction induced settlement, Buena Geotechnical Services (2007) recommended overexcavation and recompaction in the building areas and construction of either mat or post-tension slab foundations. Considering the recommended grading and foundation type, the potential for seismically induced settlement should be low. The potentials for surface fault rupture and landsliding to affect the site should be low to very low.

6.0 CLOSURE

This report is valid for conditions as they exist at this time for the type of project and associated risks described herein. Our intent was to perform this study in a manner consistent with the level of care and skill commonly exercised by members of the geologic profession currently practicing in the locality of this project under similar conditions. No representation, warranty, or guarantee is either expressed or implied. This report is intended for the exclusive use by the client as discussed in the "Scope of Services" section. Application beyond the stated intent is strictly at the user's risk.

If changes with respect to project type or location become necessary, if items not addressed in this report are incorporated into plans, or if any of the assumptions used in the preparation of this report are not correct, this firm must be notified for modifications to this report. The conclusions presented in this report are based upon the assumption that the site geologic conditions do not deviate substantially from those disclosed during our research and field reconnaissance. If any variations or undesirable conditions are encountered during construction, or if the proposed construction will differ from that planned at the present time, Earth Systems Pacific should be notified so that supplemental recommendations can be prepared as applicable.

This document, the data, conclusions, and recommendations contained herein are the property of Earth Systems Pacific. Copies may be made only by Earth Systems Pacific, the client, and the client's authorized agents for use exclusively on the subject project. Any other use is subject to federal copyright laws and the written approval of Earth Systems Pacific.

Thank you for this opportunity to have been of service. If you have any questions, please feel free to contact this office at your convenience.

End of Text

REFERENCES

Blake, T. F., EQFAULT (ver. 3.00b), 2000, A Computer Program for the Estimation of Peak Acceleration From 3-D Fault Sources," User's Manual, Newbury Park, California.

Boore, D. M. and others, 1997, "Estimating Response Spectra and Peak Accelerations from Western North American Earthquakes: a Summary of Recent Work," Seismology Research Letters, 68-1, January-February.

Buena Geotechnical Services, 2007, Geotechnical Engineering Report and Liquefaction Study for Proposed Residential Development, Val Verde Drive, Monterey County, California, unpublished consultant's report.

California Geological Survey (CGS), Bryant, W.A., 1985, Fault Evaluation Report FER-167, Faults in the Southern Monterey Bay Area.

California Geological Survey (CGS), Peterson, M.D. et al.,1996, updated 2002, Probabilistic Seismic Hazard Assessment for the State of California.

Clark, J.C. and others, 1997, Geologic Map of the Monterey and Seaside 7.5-Minute Quadrangles, Monterey County California, U.S. Geological Survey Open File Report 97-30.

Foxx, Nielsen and Associates, 1988, Preliminary Geologic Report, Proposed Carmel Green Subdivision, Carmel, California, unpublished consultant's report.

Hart, E.W., and Bryant W.A., 1997, Fault Rupture Hazard Zones in California, California Division of Mines and Geology Special Publication 42, 24 p.

Working Group on California Earthquake Probabilities, 2003, Probabilities of Large Earthquakes in the San Francisco Bay Region, California, U.S. Geological Survey Circular.

Hall, C.A., Jr., 1991, Geology of the Point Sur-Lopez Point Region, Coast Ranges, California: A Part of the Southern California Allocthon, Geologic Society of America, Special Paper 226.

Monterey County, 2001, Relative Liquefaction Susceptibility Map and Earthquake Induced Landslide Susceptibility Map, by Rosenberg, L.I.

U.S. Geological Survey, 1983, 7½-minute topographic map of the Monterey Quadrangle, California: scale 1:24,000.

AERIAL PHOTOGRAPHS

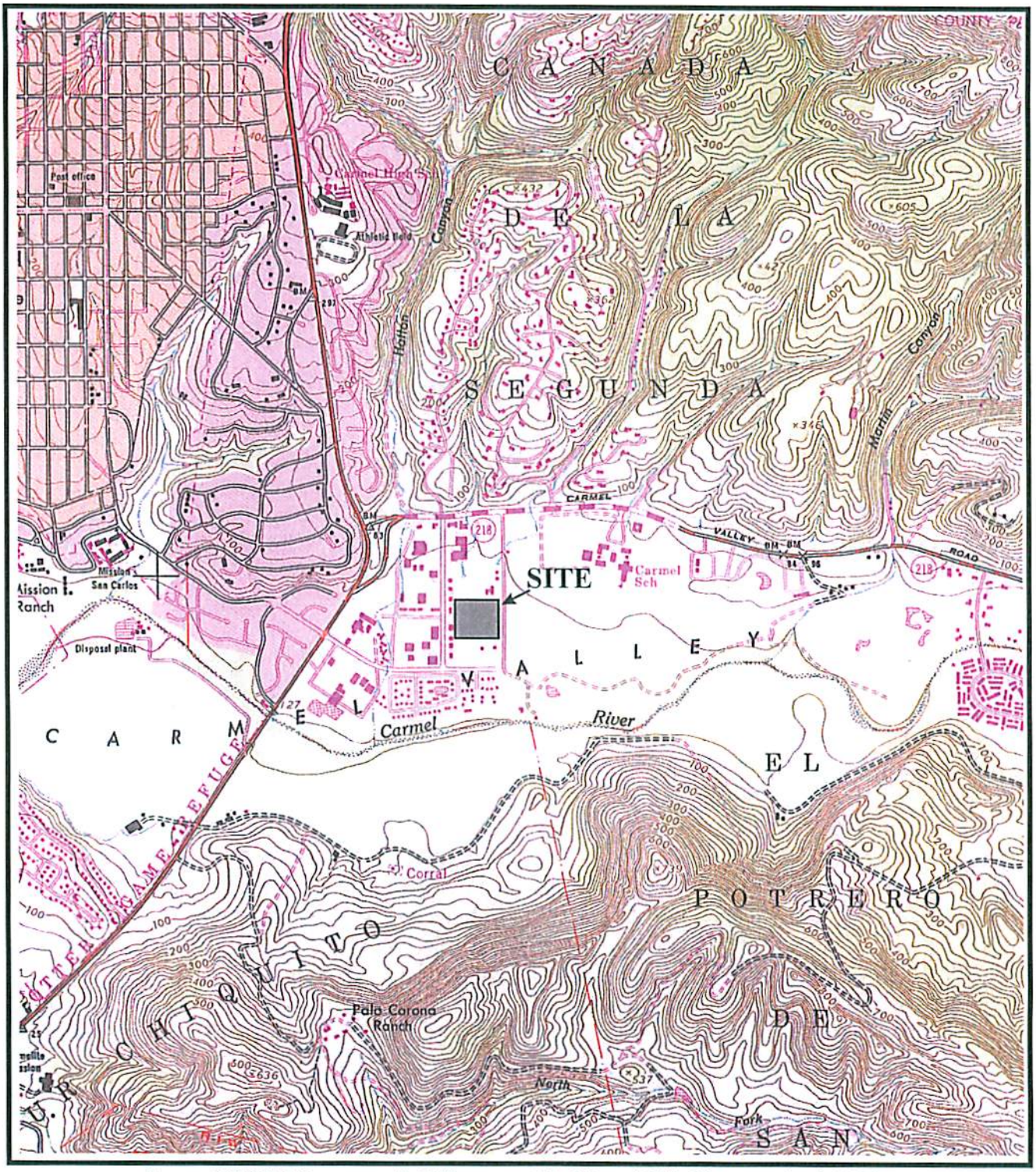
Date	Agency	Type	Roll & Frame	Scale
6/30/50	PAS	B&W	AV 36-01-04, 05	±1:12,000

APPENDIX A

Figure 1-Vicinity Map
Figure 2-Site Geologic Map
Figure 4-Regional Geologic Map
Figure 5-Regional Fault Map

File Name: Val Verde Residential Development, Carmel, California File No.: SH-11122-GA

Vicinity Map



Base: USGS Monterey 7.5' Topographic Map, 1947, Photorevised 1983

Scale 1"=2000'

Earth Systems Pacific

Appendix F-2

Geotechnical Engineering Report and Liquefaction Study

Geotechnical Engineering Report and Liquefaction Study

For

Proposed Residential Development
Val Verde Drive
Monterey County, California

June 15, 2007

B-075423

Prepared For

Brian Clark

By

Buena Geotechnical Services
3850 Ramada Drive, Suite A-2
Paso Robles, California

BUENA GEOTECHNICAL SERVICES, LLC

P.O. BOX 2857, ATASCADERO, CA 93423

June 15, 2007

B- 075423

Brian Clark
430 Ortiz Avenue #B
Sand City, CA 93955

Project: Val Verde Drive
Monterey County, California

Subject: Geotechnical Engineering Report and Liquefaction Study

As authorized, we have performed a Geotechnical Study for the above referenced project. The accompanying Geotechnical Engineering Report and Liquefaction Study presents the results of our subsurface exploration, laboratory-testing program and conclusions and recommendations for geotechnical engineering aspects of project design. Our services were performed using the standard of care ordinarily exercised in this locality at the time this report was prepared.

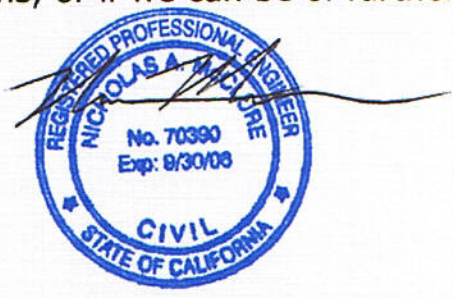
Based on our study, it is our opinion that the site is suitable for the proposed development from a geotechnical engineering standpoint provided the recommendations of this report are successfully implemented.

We have appreciated this opportunity to be of service to you on this project. Please call if you have any questions, or if we can be of further service.

Respectfully submitted,

Josh Cwikla
Project Manager

Copies: 3-Clark
1-File



Nicholas A. McClure
Civil Engineer

805-434-9490 • 805-544-0333
FAX 805-434-9098 • 831-385-3170 (King City)

INTRODUCTION

A. Project Description

This report presents results of a Geotechnical Engineering and Liquefaction Study performed for the proposed Residential Development to be located in Monterey County, California.

1. It should be noted that a grading plan was not provided for the purpose of this report. Prior to any construction, this firm should review the grading plan to verify or modify the recommendations offered herein. We anticipate that the site will be developed by building near existing grade.
2. The proposed structures are assumed to be one (1) or two (2) stories of wood framed or light gage steel stud construction.
3. Structural considerations for maximum wall loads of 1.5 kips per lineal foot were used as a basis for the recommendations of this report. If actual loads vary significantly from these assumed loads, Buena Geotechnical Services should be notified as re-evaluation of the recommendations contained herein may be required.

B. Purpose and Scope of Work

The purpose of the geotechnical investigation that led to this report was to evaluate the soil conditions of the site with respect to the proposed development. These conditions include surface and subsurface soil types, expansion potential, liquefaction potential, settlement potential, bearing capacity, and presence or absence of subsurface water. The scope of our work included:

1. Reconnaissance of the site.
2. Drilling, sampling and logging of nine (9) borings to investigate soils and groundwater conditions.
3. Laboratory testing of soil samples obtained from subsurface exploration to determine their physical and engineering properties.
4. Geotechnical analysis of the data obtained.
5. Consultation with owner representatives and design professionals.
6. Preparation of this report.

Contained in the report are:

1. Discussions on local soil and groundwater conditions.
2. Results of laboratory and field tests.
3. Conclusions and recommendations pertaining to site grading and structural design.

C. Site Setting
1. The site of the proposed development is located in Monterey County, California. See the Vicinity Map in Appendix A.
2. The site is relatively flat and appears to have been used as farmland in the past.
3. The south-east corner of the site contains an existing residence with some surrounding landscaping. The remainder of the site is vacant and unimproved.

SOIL CONDITIONS

A. Evaluation of the subsurface indicates that soils are generally dark brown slightly clayey silty fine sands within the proposed grading and bearing depths.
B. Soils encountered at approximate bearing depths are characterized by low in-place densities.
C. Expansion determination indicates that the bearing soils lie in the "Very Low" range in accordance with the U.B.C.
D. Groundwater was encountered at an approximate depth of twenty-three (23) feet.

SEISMIC AND LIQUEFACTION CONDITIONS

A. Earthquake-induced vibrations can be the cause of several significant phenomena, including liquefaction in fine sands and silty sands. Liquefaction results in a complete loss of strength and can cause structures to settle or even overturn if it occurs in the bearing zone. If liquefaction occurs beneath sloping ground, a phenomenon known as lateral spreading can occur. Liquefaction is typically limited to the upper 50 feet of the subsurface soils and to soils that have a relative density of less than 70%.
B. In order to determine the potential for liquefaction at the project site, the $(N_1)_{60cs}$ modified blow counts and the corresponding liquefaction FoS (Factor of Safety) were determined with the program Liquefy2. The project site boring data was compiled and analyzed in conjunction with the following Liquefy2 program parameters.

r_d Factor – NCEER (1997) Magnitude Scaling Factor – Idriss (1997)

EQ Mag. (Mw) – 7.3 Peak Acc. (g) – 0.38 (Appendix A)

Boring Water Depth (ft) – 23 Total Boring Depth (ft) – 50

Boring Sample Increments (ft) – 5-10 ft

D50, varied between layers (in) – 0.006 to 0.024

C. An online program made available by the California Geological Survey was used to determine the site specific peak ground acceleration. The acceleration value is based off the USGS/CGS Probabilistic Seismic Hazards Assessment (PSHA) Model, 2002 (revised April 2003) for earthquakes having a 10% probability of being exceeded in 50 years. The site geographical coordinates were provided as an input into the program, which provided an output table of peak ground acceleration values for various soil types.

D. The soils profile type in UBC Table 16J should be S_e. The seismic zone factor (Z) in UBC Table 16I should be 0.40. The seismic source is the San Gregorio Fault – Sur Region (M7.3, Type B Fault) with a distance of less than 8 km and the Monterey Bay – Tularcitos (M7.1, Type B Fault) with a distance of less than 6 km.

E. The fines content varied with depth between 15-44%. Surface soils were found to contain approximately 15% fines and soils greater than fifteen (15) feet in depth below grade were found to contain 44% fines.

F. The Liquefy2 output file data plots (Figures 1 and 2), show the $(N_1)_{60cs}$ values varying with depth and the liquefaction Factor of Safety (FoS) above and below the water table. It should be noted that the liquefaction FoS below the water table ranges between 0.7 and 0.8, whereas minimum desirable FoS values are typically between 1.3 and 1.5.

G. Based on our study, it is our opinion that if design earthquake conditions are experienced, the potential for liquefaction at depths below twenty-three (23) feet is likely, and that substantial grading, drainage, and special foundation designs should be implemented in order to minimize the effects that liquefaction could have on the proposed structures and development.

H. Due to the relatively level conditions and absence of any abrupt elevation changes across the building site, the potential for lateral spreading should be low to minimal.

CONCLUSIONS AND RECOMMENDATIONS

The following geotechnical engineering report outlines grading and foundation recommendations that should be incorporated into the design and construction of the development in order to support the proposed structures and to help mitigate the effects of liquefaction at the proposed project site.

Deep foundation designs including the incorporation of vibroflotation, stone columns, or deep driven piles would be most effective in resisting the settlements induced by liquefaction, and recommendations for these systems can be provided upon request. However, due to the substantial costs involved with implementing the above mentioned design methods, specifications for the design and construction of mat or post-tensioned foundations in conjunction with grading recommendations have been provided in this report. Whereas deep foundations work to isolate the structure from liquefaction induced settlement, mat and post-tensioned foundations work to limit differential settlement to tolerable levels while potentially allowing for two to four (2-4) inches of total settlement. The use of either a post tensioned slab or mat foundation to support the proposed structures assumes that the developer or contractor is willing to accept the above mentioned settlements in a seismic event.

It should be noted that buried utilities such as gas and water pipes should be designed with localized automatic shutoff systems and flexible connections at transition locations to structures or service equipment.

A. Grading

1. General Grading
   a. Grading, at a minimum, should conform to Chapter 33 of the Uniform Building Code.
   b. The existing ground surface should be initially prepared for grading by removing all vegetation, trees, large roots, debris, non-complying fill and all other organic material. Voids created by removal of such material should not be backfilled unless the underlying soils have been observed by the Geotechnical Engineer.
   c. The bottom of all excavations should be observed by a representative of this firm prior to processing or placing fill.

d. Fill and backfill placed at near optimum moisture in layers with loose thickness not greater than eight (8) inches should be compacted to a minimum of 90% of maximum dry density obtainable by the ASTM D 1557 Test Method.

e. Import soils used to raise site grade should be equal to or better than on-site soils in strength, expansion and compressibility characteristics. Import soils can be evaluated, but will not be pre-qualified by the Geotechnical Engineer. Final comments on the characteristics of the import soils will be offered after the material is at the project site.

f. Roof draining systems should be designed so that water flows into controlled drainage pathways that discharge to municipal storm drains.

g. In order to minimize near surface water retention, surface water should not be allowed to pond. All hardscaped and landscaped surfaces should be sloped away from structures and to approved drainage systems.

h. It is recommended that Buena Geotechnical Services be retained to provide intermittent geotechnical engineering services during site development, grading and foundation construction phases of the work to observe compliance with the design concepts, specifications and recommendations, and to allow design changes in the event that subsurface conditions differ from those anticipated prior to the start of construction.

i. Plans and specifications should be provided to Buena Geotechnical Services prior to grading. Plans should include the grading plans, foundation plans and foundation details. Structural loads should be shown on the foundation plans.

j. Should soils become unstable during grading due to excessive subsurface moisture, alternatives to correct instability may include aeration or the use of gravels and/or geotextiles as stabilizing measures. Recommendations for stabilization should be provided by this firm as needed during construction.

2. <u>Site Grading/Development</u>

<u>Grading Pads</u>

a. Overexcavation and recompaction of soils in the building area will be necessary to provide a localized dense mass of soil to support the proposed mat or post tensioned slab foundations, to decrease the potential for differential settlement and to provide more uniform bearing conditions. Soils should be overexcavated to a depth of four (4) feet

below the bottom of footings, five (5) feet below existing grade, or 75% of the deepest fill thickness, whichever is greater. The over-excavation should extend to a distance of five (5) feet beyond the building perimeter. The resulting surface should be scarified to a depth of one (1) foot, moisture conditioned and recompacted to a minimum of 90% of maximum dry density and then lined with ProPex 2044 or better woven geotextile fabric. The geotextile fabric is to be pulled level and not allowed to bunch as it is covered with an initial twelve (12) inch layer of native material that is to be moisture conditioned and compacted to 90% of maximum dry density before replacing the remaining of the previously removed material in thin lifts. The replaced material is to be moisture conditioned and recompacted to 90% of maximum dry density.

b. Areas outside the building area to receive fill, exterior slabs-on-grade, sidewalks and paving should be overexcavated to a depth of one (1) foot. The exposed surface should be scarified, moisture conditioned and recompacted.

c. On-site soils may be used for fill once they are cleaned of all organic material, rock, debris and irreducible material larger than eight (8) inches.

d. Although not encountered in our borings, should any trash, debris or subsurface structures be encountered during grading, removals will be necessary to adequate depths and horizontal limits as recommended by this firm at the time of grading.

3. Estimated Pavement Sections

a. As considerable grading of the site is planned samples of soils should be taken at the completion of grading to design pavement sections. The following pavement sections are based on assumed R-Value of thirty (30) for the native soils. The sections were calculated by using the Caltrans Highway Design, including the structural section safety factor. The calculated base and asphalt concrete thicknesses are for compacted material.

R-Value	Traffic Index	A.C. In.	CL II Agg. Base In.
Native Soil	4	2.0	5.5
Native Soil	5	2.5	7.0
Native Soil	6	3.0	8.5

b. The upper twelve (12) inches of subgrade and all aggregate base should be compacted to a minimum of 95% of maximum dry density.

c. If the pavement is placed before the construction on the project is completed construction loads should be taken into account.

4. Slope Construction
   a. Although not expected for the scope of this project, all hillside grading and construction of fill slopes should conform to the minimum standards listed in Chapter 33 of the Uniform Building Code. It is recommended that the Geotechnical Engineer review the grading plans prior to grading and site development.
   b. Fill slopes should be keyed and benched into firm natural ground when the existing slope to receive fill is 10:1, horizontal to vertical, or steeper. The keys should be tilted into the slope, should be a minimum of one equipment width wide, and should extend a minimum of three (3) feet deep at the outside edge.
   c. Fill slopes should be overfilled, compacted and cut back to planned configurations. This will yield better compaction on the slope faces than other methods.
   d. Lined drainage swales and down drains should be provided at the tops of all cut and fill slopes to divert drainage away from the slope faces.

5. Utility Trenches
   e. Utility trench backfill should be governed by the provisions of this report relating to minimum compaction standards. In general, service lines inside of the property lines may be backfilled with native soils and compacted to a minimum of 90% of maximum dry density. Backfill of offsite service lines will be subject to the specifications of the jurisdictional agency or this report, whichever is more stringent.
   f. Geotechnical Engineer to monitor compliance with these recommendations.

B. Structural Design
   1. Foundations
      a. Structures may be supported on a conventionally reinforced mat foundation coupled with an underlying grid network of footings, or on a post tensioned slab foundation underlain with a thickened perimeter footing.
      b. If a mat slab foundation design is used to support the structures, the structural engineer is to design the foundation and reinforcement to span or cantilever over a minimum horizontal distance of eight (8) feet. A modulus of subgrade reaction (Kv) of 60 pci and a maximum bearing capacity for dead and live loads of 1200 psf should be used

in the beam on elastic foundation design process. For planning purposes, mat foundations are expected to be a minimum of ten (10) inches thick with a minimum of two (2) #4 bar mats, with one (1) mat set at the top and one (1) mat set at the bottom of the slab structural section.

c. Mat slabs should be underlain with a grid network of footings spaced no more than fifteen (15) feet o.c. each way. Underlying footings are expected to a minimum of fifteen (15) inches wide and eighteen (18) inches deep reinforced with a minimum of two (2) #5 bars set at the top and bottom in the footings. The mat slab is to be doweled into the footing by bending and extending the slab reinforcement into the footing. Dowels are to be spaced no greater than twelve (12) inches on center.

d. If a post tensioned slab system is used to support the structure, slabs should be designed with thickened edges or perimeter footings extending a minimum of eighteen (18) inches below lowest adjacent grade.

e. Slabs and footings should bear entirely into firm recompacted soils.

f. Allowable bearing values are net (weight of footing and soils surcharge may be neglected) and are applicable for dead plus reasonable live loads.

g. Bearing values may be increased by one-third when transient loads such as wind and/or seismicity are included.

h. Lateral loads may be resisted by soils friction on floor slabs and foundations and by passive resistance of the soils acting on foundation stem walls. Lateral capacity is based on the assumption that any required backfill adjacent to foundations and grade beams is properly compacted.

i. For structures to be constructed above slopes, the outside faces at the bottom of footings should provide a minimum horizontal distance of five (5) feet from the slope face.

j. Soils supporting foundation slabs and footings should be lightly moistened prior to pouring concrete.

k. Foundation excavations should be observed by a representative of Buena Geotechnical Services after excavation, but prior to placing reinforcing steel or forms.

l. The soils profile type in UBC Table 16J should be S_e. The seismic zone factor (Z) in UBC Table 16I should be 0.40. The seismic source is the San Gregorio Fault – Sur Region (Type B Fault) with a distance of less than 8 km and the Monterey Bay – Tularcitos (Type B Fault) with a distance of less than 6 km.

2. Slabs-On-Grade
   a. Concrete slabs should be supported by compacted structural fill as recommended earlier in this report.
   b. It is recommended that perimeter slabs (walks, patios, etc.) be designed relatively independent of footing stems (i.e. free floating) so foundation adjustment will be less likely to cause cracking.
   c. Slabs should be underlain with a minimum of four (4) inches of clean and free draining sand. Areas where floor wetness would be undesirable should be underlain with a moisture barrier to reduce moisture transmission from the subgrade soils to the slab. The membrane should be placed at mid-height in the clean sand.
3. Frictional and Lateral Coefficients

   The following foundation design load conditions assume that the foundation is founded into firm recompacted material as described in the Site Grading/Development section of this report.

   a. Resistance to lateral loading may be provided by friction acting on the base of foundations. A coefficient of friction of 0.35 may be applied to dead load forces. This value does not include a factor of safety.
   b. Passive resistance acting on the sides of foundation stems equal to 350 pcf of equivalent fluid weight may be included for resistance to lateral load. This value does not include a factor of safety. However, when passive resistance is used in conjunction with friction, the coefficient of friction should be reduced by one-third in determining the total lateral resistance.
   c. A one-third increase in the quoted passive value may be used when considering transient loads such as wind and seismicity.
4. Settlement Considerations
   a. If mat or post tensioned slab foundations are used to support the proposed structures, maximum expected differential settlements during a severe seismic event of approximately one (1) inch are anticipated for foundations and floor slabs designed as recommended. Total settlement may occur on the order of two to four (2-4) inches as described earlier in this report.
   b. Differential settlement between adjacent load bearing members should be less than one-half the total settlement.

5. Retaining Wall

The following retaining wall foundation design load conditions assume that the retaining wall foundation is founded into firm recompacted material as described in the Site Grading/Development section of this report.

a. Conventional cantilever retaining walls bearing in soils prepared in accordance with Section A-2 of this report and backfilled with compacted on-site soils may be designed for the lateral pressures listed below:

Active Case	35 pcf
At Rest Case	65 pcf
Passive Case	350 pcf
Max. Toe Pressure	1200 psf
Coefficient of Sliding Friction	0.35

b. The pressures listed above were based on the assumption that backfilled soils will be compacted to 90% of maximum dry density as determined by ASTM D 1557 Test Method.
c. The lateral earth pressure to be resisted by the retaining walls or similar structures should include the loads from any structures or temporary loads that influence the wall design.
d. A back drain or an equivalent system of backfill drainage should be incorporated into the retaining wall design. Backfill immediately behind the retaining structure should be a free-draining granular material. Alternatively, the back of the wall could be lined with a geodrain system.
e. Compaction on the uphill side of the wall within a horizontal distance equal to one wall height should be performed by hand-operated or other lightweight compaction equipment. This is intended to reduce potential "locked-in" lateral pressures caused by compaction with heavy grading equipment.
f. Water should not be allowed to pond near the top of the wall. To accomplish this, the final backfill site grade should be such that all water is diverted away from the retaining wall.

ADDITIONAL SERVICES

This report is based on the assumption that an adequate program of monitoring and testing will be performed by Buena Geotechnical Services during construction to check compliance with the recommendations given in this report. The recommended tests and observations include, but are not necessarily limited to the following:

1. Review of the building and grading plans during the design phase of the project.
2. Observation and testing during site preparation, grading, placing of engineered fill, and foundation construction.
3. Consultation as required during construction.

LIMITATIONS AND UNIFORMITY OF CONDITIONS

The analysis and recommendations submitted in this report are based in part upon the data obtained from the borings drilled on site. The nature and extent of variations between and beyond the borings may not become evident until construction. If variations then appear evident, it may be necessary to re-evaluate the recommendations of this report.

The scope of our services did not include environmental assessment or geological study. The scope of services did not include investigation for the presence or absence of wetlands, hazardous or toxic materials in the soil, surface water, groundwater or air. Any statements in this report or on the soil boring logs regarding odors, unusual or suspicious items or conditions observed are strictly for the information of the client.

Findings of this report are valid as of this date, however, changes in a condition of a property can occur with passage of time whether they be due to natural processes or works of man on this or adjacent properties. In addition, changes in applicable or appropriate standard may occur whether they result from legislation or broadening knowledge. Accordingly, findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of one (1) year.

In the event that any changes in the nature, design, or location of the structure and other improvements are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing.

This report is issued with the understanding that it is the responsibility of the owner or his representatives to insure the information and recommendations offered herein are called to the attention of the project architect and engineers. It is also the responsibility of the

owner or his representatives to insure the information and recommendations offered herein are incorporated into the project plans and specifications and the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

Buena Geotechnical Services has prepared this report for the exclusive use of the client and authorized agents. This report has been prepared in accordance with generally accepted geotechnical engineering practices. No other warranties, either expressed or implied, are made as to the professional advice provided under the terms of this agreement.

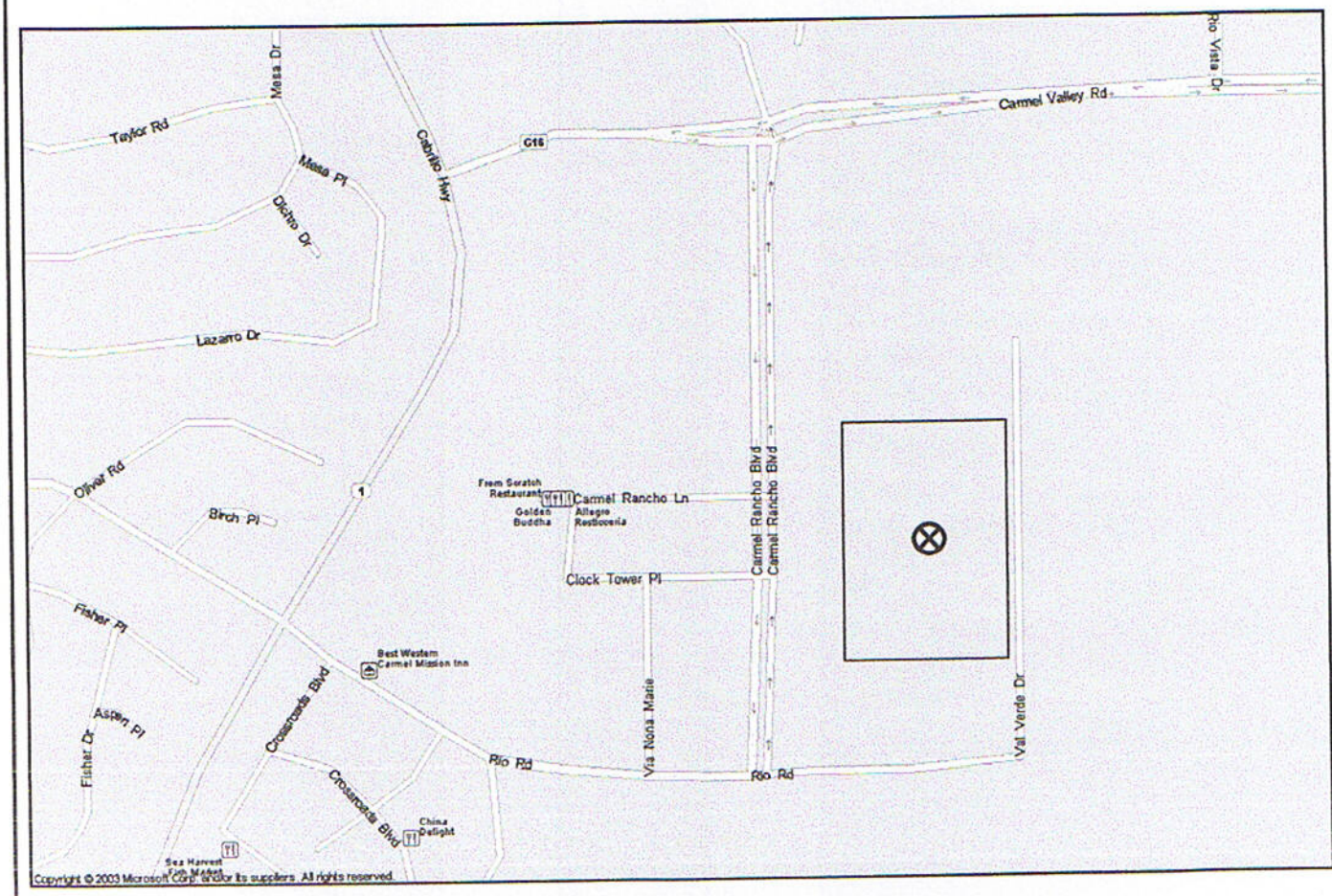
It is recommended that Buena Geotechnical Services be provided the opportunity for a general review of final design and specifications in order that earthwork and foundation recommendations may be properly interpreted and implemented in the design and specifications. If Buena Geotechnical Services is not accorded the privilege of making this recommended review, we can assume no responsibility for misinterpretation of our recommendations.

END OF TEXT
Appendices

APPENDIX A

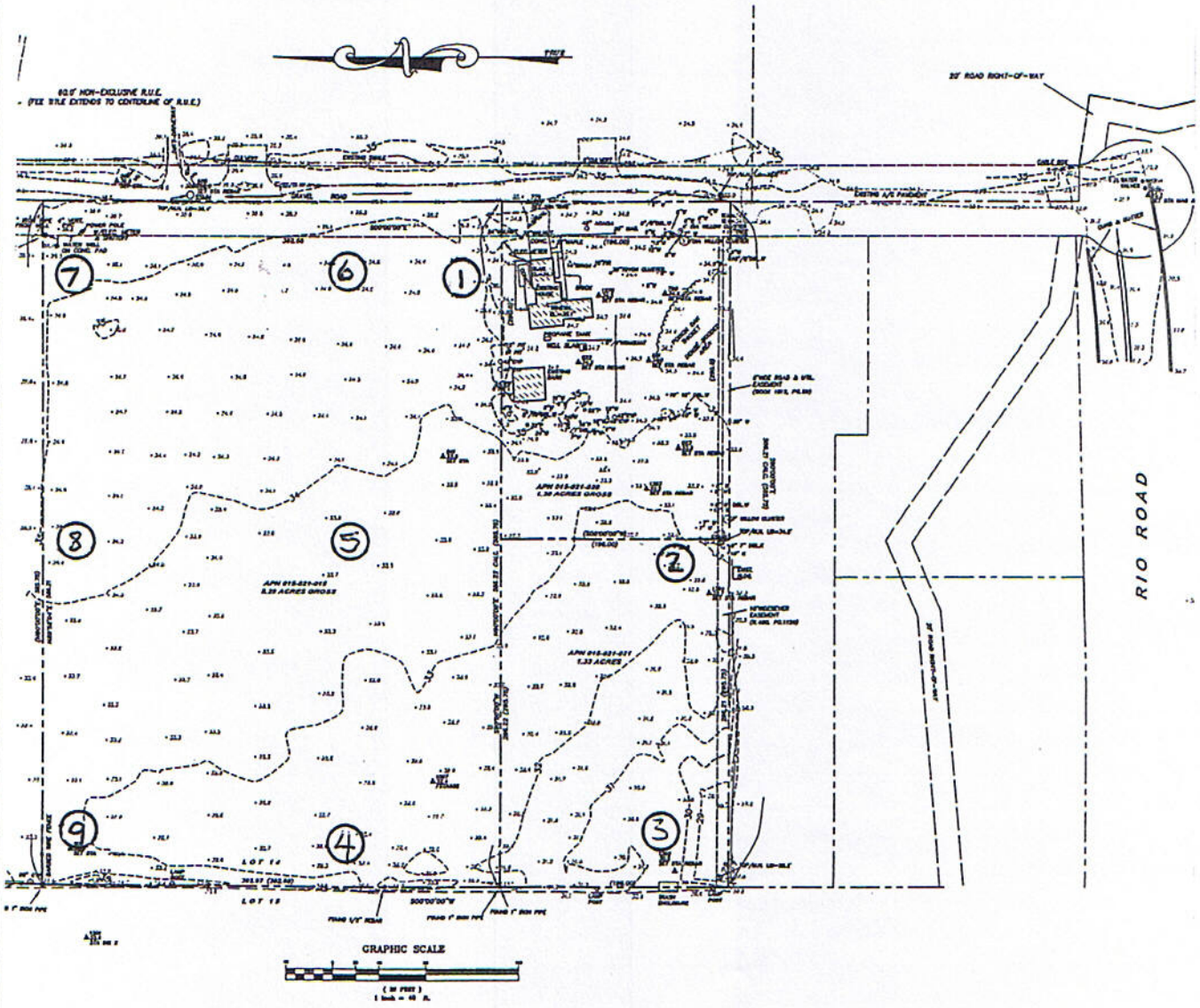
Vicinity Map
Site Maps
Field Investigation
Boring Logs
Unified Soil Classification

Note: ⊗ =Approximate Project Location –
26500 Val Verde Drive, Monterey County, California



PROJECT No. B-075423	VICINITY MAP
BUENA GEOTECHNICAL SERVICES	

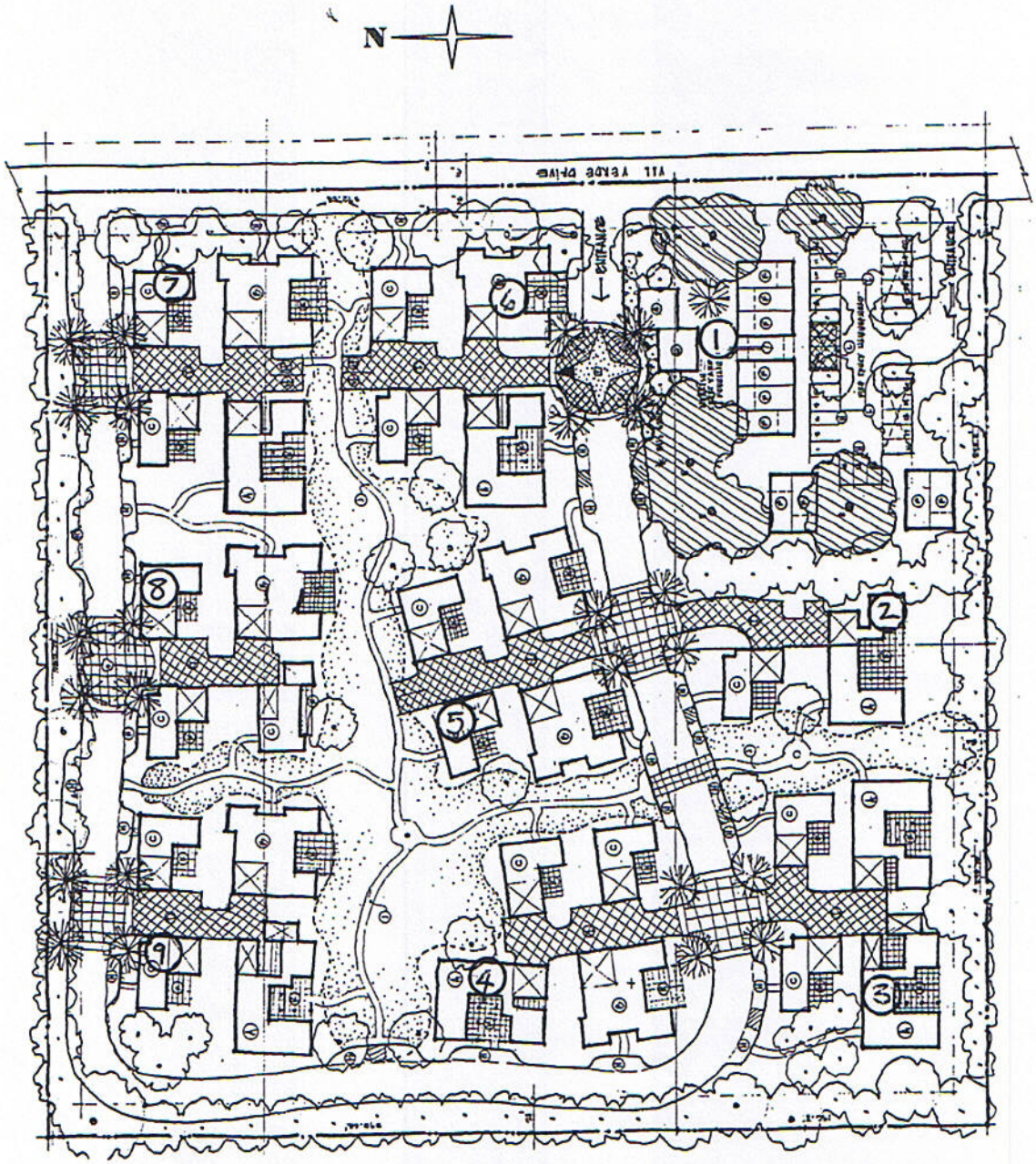
Key: ⓝ = Approximate Soils Boring Location



Note: Site Map is for reference only and is not to scale

PROJECT No. B-075423	
BUENA GEOTECHNICAL SERVICES	SITE MAP – VACANT LOT

Key: ⓐ = Approximate Soils Boring Location



Note: Site Map is for reference only and is not to scale

PROJECT No. B-075423	SITE MAP – PROPOSED DEVELOPMENT
BUENA GEOTECHNICAL SERVICES	

Appendix G

Hydrology and Water Quality Studies

Appendix G-1

Review of Stormwater Management and Flood Control Issues

MEMO

To: Megan Jones (Rincon Consultants)

From: Edward D. Ballman, P.E.

Date: August 16, 2016

Subject: Review of Stormwater Management and Flood Control Issues at the Carmel Rio Road Project, County of Monterey

Per your request, Balance Hydrologics has completed a technical review of issues associated with stormwater management and flood control at the proposed Carmel Rio Road project in the County of Monterey. The intent of the review is to identify issues that must be addressed in documentation to satisfy the California Environmental Quality Act, and to assess the degree to which information submitted by the project proponent addresses those issues.

Stormwater Management

Stormwater management strategies and infrastructure are typical aspects to be considered in any change of land use. The approach for dealing with stormwater runoff is most often predicated on (or required by) local and regional guidelines and regulations. For this site, the primary guidance comes from the County in the form of guidelines for control of peak flow rates and from regulations promulgated by the Central Coast Regional Water Quality Control Board (RWQCB). The latter are spelled out in detail in the Central Coast Post-Construction Stormwater Requirements (PCRs) adopted as Resolution Number R3-2013-0032.

The PCRs specifically require the Project to complete a Stormwater Control Plan, and we understand that one has not been submitted at this time. Therefore, the following comments are based on the review of site plans prepared by Bestor Engineers dated March 10, 2014 and a set of preliminary hydrologic calculations also prepared by Bestor Engineers and dated December 7, 2011.

Peak flow control. Sheet C-4 of the plan set indicates that the site will generally drain via gutter flow in a westerly direction and eventually enter a gravity-flow storm drain system that will connect to an existing 42-inch diameter trunk storm drain line that runs from north to south along the western boundary of the project. This trunk line is the main drainage conduit for County Drainage Area 28 (DA-28), a watershed of 184 acres that extends from north of Carmel Valley Road to eventually discharge directly into the Carmel River south of the Riverwood Townhomes. Storm drain modeling presented in the County Services Area 50 Final Lower Carmel River Stormwater Management and Flood Control Report (County of Monterey, October 2014, "CSA-50 Report") identified this trunk line as a potentially large source of drainage overflow that could lead to localized flooding along Rio Road and as far north as the retail businesses located just

south of Carmel Valley Road. The primary causes of the predicted overflow are insufficient trunk line capacity, high tailwater conditions in the main river, and lack of back flow prevention at the outfall.

The fact that the DA-28 trunk storm drain line has been identified as inadequate in its existing condition implies additional stormwater runoff likely cannot be added to the system without impacts. Therefore, it is reasonable to assume that the project will pursue measures to control peak runoff flow rates from the site. The current County of Monterey design guideline in this regard calls for the post-project 100-year peak discharge to be reduced to, or below, the pre-project 10-year value. Application of this standard at the Project would likely be sufficient to avoid impacts with respect to increases in peak flow.

The Bestor calculations from 2011 include a preliminary estimate of the required detention storage needs to meet the County criteria. The storage volume identified in the calculations is approximately 18,000 cubic feet, though the actual value may be considerably larger.[1] The site plans imply that the required storage volume will be provided in the form of a large underground perforated pipe along the western edge of the property. The pipe is called out as 6.5 feet in diameter with a total length of 401 feet. Such a pipe would have a total storage volume (without any allotment for freeboard) of roughly 13,300 cubic feet. No explanation is provided for the discrepancy between the calculated volume and that indicated on the plans.

Conceptually, underground detention storage can be made to work if properly designed and sized. However, additional details will need to be resolved including how the storage and flow routing will work with potentially high hydraulic gradelines in the existing trunk storm drain.

Stormwater quality. The Project location is such that it qualifies as a Special Circumstances case under Performance Requirement 5 of the PCRs. This is due to the fact that runoff from the project would be routed in an underground storm drain system to a discharge point in the Carmel River where the watershed area is greater than the threshold value of 200 square miles. Qualification under Performance Requirement 5 essentially exempts the Project from Requirement 4 (Peak Management) that would otherwise apply given the Watershed Management Zone 1 designation for the site. However, the site does overlie a designated groundwater basin and such sites with a WMZ 1 designation are not exempt from Performance Requirement 3 (Runoff Retention). Therefore, the Project needs to comply with the Performance Requirement 1 Site Design and Runoff Reduction, Requirement 2 Water Quality Treatment, and Requirement 3.

Performance Requirement 1 should be generally straightforward at the site. However, this does not appear to be the case for the latter two Requirements.

[1] The calculations will need to be revised as site plans evolve, but we note that a number of non-conservative factors appear to have been used. These include: a runoff coefficient of 0.8 for impervious surfaces during a 100-year event, site impervious cover of roughly 56 percent (markedly at odds with the values cited in the landscaping plans), and identical times of concentration for pre- and post-project conditions (when development will almost certainly speed runoff from the site). Preliminary review by Balance engineers indicate that a more conservative value would be on the order of 25,000 cubic feet.

The site plans do not appear to include treatment controls capable of meeting the Low Impact Development (LID) standards enumerated in Performance Requirement 2. The site is underlain by relatively high permeability Pico sandy loam soils, and infiltration of stormwater could potentially be used as a component of the management approach, notably in a manner that would help to preserve groundwater recharge capacity at the site. However, the percolation capacity of the perforated pipe shown on the site plans appears to be considerably less than that required to meet the treatment requirements stipulated by the PCRs solely through infiltration of runoff.

Additionally, Performance Requirement 3 will require that the site retain (rather than detain) the entire volume of runoff associated with storms up to the 95th-percential 24-hour storm event. Per reference materials supplied by the RWQCB, this storm event represents 1.3 inches of rainfall in a 24-hour period. Calculations demonstrating compliance with this criterion have apparently not been completed, but comparison with similar projects indicates that a substantial area will need to be utilized. One viable approach would be through use of a stormwater infiltration basin with a floor area sufficiently large to percolate the required runoff volume given the infiltration characteristics of the underlying soils. The floor area of such a basin could be reduced if ponding depth is allowed, but will likely be on the order of 6,000 square feet or more. Appropriately designed, such a basin could also be used to limit peak flow rates to the off-site DA-28 storm drain system.

Flood Control

Per the CSA-50 Report, the site is exposed to flood risks from two distinct flooding sources: overbank flows from the Carmel River and overland flows from the current downstream end of the relatively large north bank tributary known as County Drainage Area 27 (DA-27).

Riverine flooding. A small portion of the Project at the southwest corner of the property is located within a Special Flood Hazard Area (100-year floodplain) mapped by the Federal Emergency Management Agency (FEMA) and analyzed in the CSA-50 Report. The primary source of this flood hazard is overbank flows from the main stem of the Carmel River due to channel overtopping east of Val Verde Drive and, to a lesser extent along the Riverwood Townhomes.[2] The site plans appropriately identify and map the boundaries of the floodplain, though it is important to note that the plans use a different vertical datum for elevations than that used on the currently-effective Flood Insurance Rate Map.

The site plans show that the lower existing ground elevation portions of the property will be raised through use of retaining walls and fill so that they are above the elevation of the 100-year flood. This is an appropriate measure for protecting the Project site from the riverine flood risk. However, the placement of fill will remove some floodplain storage and could potentially alter overbank flow paths as well. The Project documentation available for review did not address the latter issues, though the impact on residual flood elevations is likely to be very small.

The CSA-50 report identified a number of potential measures that could be implemented with the objective of eliminating the riverine flood risk in the north overbank area (including the Project

[2] The CSA-50 Report also shows that backwater flooding through the DA-28 trunk storm drain line can also contribute to localized flooding in the same low elevation areas at the site.

site). Such measures would have the benefit of removing the flood hazard at the site without the potential for adverse flooding impacts to other occupied structures. One such measure would be raising the elevation of Val Verde Drive so that it can function as a levee protecting areas to the west from the 100-year flood. An alternative configuration could use a tie-back levee from Rio Road to Rancho Cañada. However, it must be acknowledged that the required work would extend well beyond the Project site and would require addressing tributary drainage issues described below.

Flooding from DA-27. Modeling of overland flow break-outs from DA-27 was a component of the work for the CSA-50 Report. DA-27 is a moderately large local tributary to the Carmel River, with a total drainage area of 567 acres (0.88 square miles) extending to the ridgelines of Jack's Peak to the north. Flow paths within this drainage area are well defined in the steep canyon setting north of Carmel Valley Road, but essentially disappear on the south side of the road where a small ditch carries flow for a short distance before ending at a point approximately 700 feet north and west of the northeast corner of the Project. The overland flow modeling presented in the CSA-50 Report shows that the intervening topography is such that much of the runoff originating in DA-27 would flow south and west to cross Val Verde Drive at the Project site and into CSA-50. The modeling shows that as much as 46 acre-feet could enter CSA-50 from DA-27 and much of this would be overland flow through the site.

The site plans do not appear to include any accommodation of this potentially large overland flow. In fact, the street layout in the March 10, 2014 plans are configured such that there is a risk they would collect overland flow and route it into the Project with no clear indication of a means to avoid localized flooding on-site and/or an overland release compatible with adjacent properties. The on-site problem could be eliminated by raising the elevation of Val Verde Drive sufficiently to protect the Project from the DA-27 overland flows, but doing so would block the natural flow release across the property and would require some means of redirecting the flows in a manner that does not impair or endanger adjacent properties to the east. Absent measures to redirect runoff from DA-27, the Project site plan will need to be modified to explicitly address the means to safely collect and convey flow through the site and then disperse them at the downslope project boundary in a way that does not adversely impact adjacent parcels.

Appendix G-2

Groundwater Supply Technical Report

TODD GROUNDWATER

August 3. 2016

MEMORANDUM

To: Megan Jones, Senior Program Manager, Rincon Consultants, Inc.

From: Gus Yates, Senior Hydrologist

Re: Carmel Rio Road EIR—Groundwater Supply Technical Report

INTRODUCTION

The Carmel Rio Road development project would convert three parcels with a combined area of 8.12 acres in the lower Carmel Valley from a primarily agricultural land use to a residential subdivision with 24 single-family market-rate homes and 7 inclusionary housing units. The site is located between Carmel Valley Road and the Carmel River, 0.5 mile upstream of State Highway 1 (**Figure 1**). Two-thirds of the total site area was actively used to farm truck crops until the property changed hands and development was first contemplated in 2005. A single rural residence and natural vegetation occupied the remaining area. Prior to 2005, almost all of the irrigation supply was obtained from the Old Travers well located near the northeast corner of the site, and domestic supply was obtained from the Old Gamboa well in the southeastern part of the site. Both wells have since been replaced, and the replacement wells are located near one another in the southeastern part of the site (Figure 1). The Carmel Rio project proposes to use the Gamboa Replacement well as the primary source of supply, and the New Travers well would serve as a backup supply.

This report addresses several issues relevant to compliance with the California Environmental Quality Act and Monterey Peninsula Water Management District's (MPWMD) permit requirements for water distribution systems that rely on groundwater. These include evaluation of:

- average annual water use before and after construction of the project ("baseline" and "project" conditions),
- changes in water-table drawdown at nearby wells during the maximum-demand day and single pumping cycles,
- the adequacy of pumping rates at the primary and backup wells to meet peak day demand,
- groundwater quality with respect to drinking water standards,
- changes in on-site groundwater recharge, and
- potential induced percolation from the Carmel River due to changes in the annual groundwater balance.

This memorandum does not address several other hydrologic and water-system issues that need evaluation to complete the permitting and environmental review process, including water rights, fire flow adequacy, water system management, and site drainage.

ANNUAL WATER USE

Most of the Carmel Rio project's potential impacts related to groundwater depend on the amount of groundwater pumped. If the project would use less water than was used on the site under historical baseline conditions, it would not adversely impact groundwater conditions. Conversely, any increase in water pumping above pre-project levels would constitute an adverse and significant environmental impact, mandating mitigation. This general premise was described as "undisputed" by Monterey County Superior Court judge Bamattre-Manoukian in the 2001 decision regarding the September Ranch Project, which also proposed to build houses on undeveloped land in the Carmel Valley (87 Cal.App.4th 99 , 104 Cal.Rptr.2d 326). The comparison of baseline and project water use is commonly done on the basis of average annual water use, and those calculations are presented in this section. Subsequent sections address potential impacts for which additional factors play a role.

Baseline Water Use

Unlike the September Ranch case, historical land and water use on the Carmel Rio project site are both well documented. Aerial photographs during the late 1990s and early 2000s show that the site was used to grow truck crops (Google Earth images for 1998, 2002 and 2004). Plans for development commenced in 2005, and the fields were fallow during 2005-2009. Agricultural activities resumed in 2010 and gradually increased to the pre-2005 level of intensity by 2013.

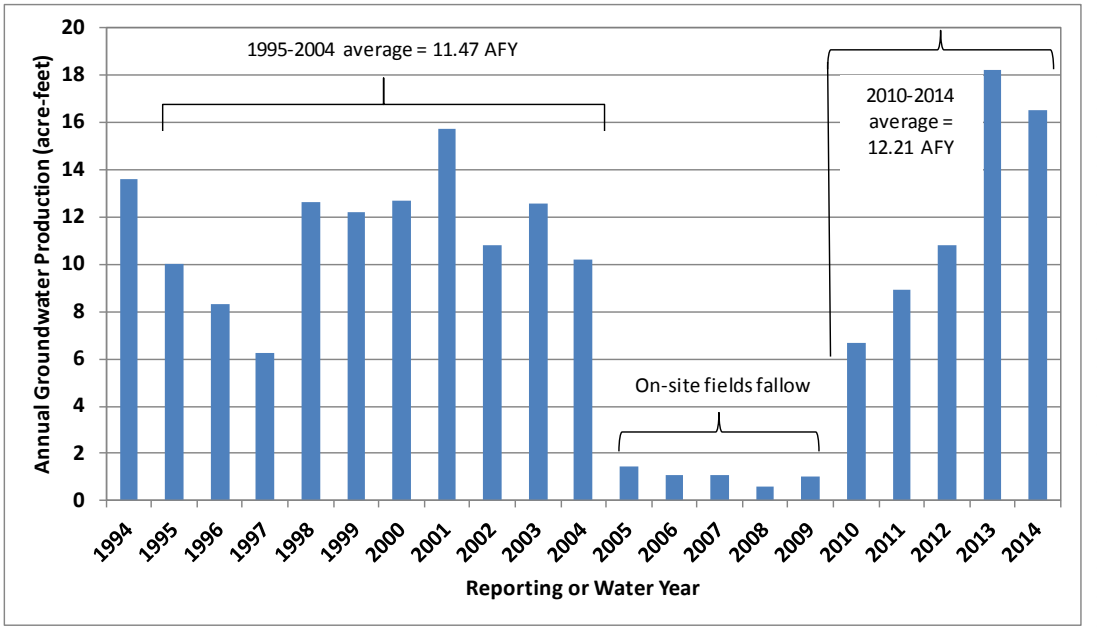
Production from wells at the site is metered and annual volumes have been recorded by MPWMD since 1994. Annual production during 1994-2014 is shown in **Figure 2**. Given the variability of water use during that period, it is important to select a baseline period that represents the most recent historical period prior to the beginning of the development process. The September Ranch decision expressed this criterion as follows:

> "An EIR must include a description of the environment in the vicinity of the project, as it exists before the commencement of the project, from both a local and regional perspective."

The Decision suggested that the date of the notice of preparation of the EIR or the time when environmental analysis commenced would be appropriate to use as the date representing existing conditions. The notice of preparation for the Carmel Rio project EIR issued on July 17, 2015, a decade after on-site land and water use changed markedly relative to the prior historical period of continuous farming. Therefore, the notice of preparation date is not suitable for evaluating baseline water use in this case.

The September Ranch decision allowed that "the date for establishing baseline cannot be a rigid one." It discussed the concern that the project applicant might have intentionally increased water use during the environmental review period—which stretched out over several years—in an attempt to establish a high baseline. In the Carmel Rio case the opposite occurred. The applicant ceased agricultural activities entirely once the development process was initiated in 2005. The applicant resumed agricultural activities in 2010 and water use returned to a level that equaled and in one year slightly exceeded amounts used prior to 2005. Thus, the 2005-2009 period is clearly not representative of water use on the site immediately before the development process commenced.

Figure 2. Metered Annual Groundwater Use at the Carmel Rio Site, 1994-2014



Note: Reporting year is July-June (1993-2001 data); water year is October-September (2002-2014 data)

The baseline period that best represents water use before the development process commenced is 1995-2004. The period includes wet, dry and normal years and is long enough that the average is not unduly influence by any unusual years. Metered water use during that period averaged 11.47 AFY.

MPWMD has suggested that the 2010-2014 period might also be appropriate for calculating baseline water use (Hampson, 2015). Average water use during that period (12.21 AFY) was slightly greater than during 1995-2004. However, the difference does not affect impact conclusions because project water use would be less than water use during either of the two possible baseline periods. Including 2005-2009 in the baseline period results in a much lower average water use but is not truly representative of conditions prior to the development effort. For example, average water use during the most recent 10 year of data (2005-2014) was 6.63 AFY, and average use during the entire period of record was 9.11 AFY. The remainder of this memorandum focuses on the 1995-2004 baseline period, which is considered more representative of pre-project conditions. However, comparisons with alternative baseline periods are included for informational purposes.

Water Use after Development

Average annual water use following development has been estimated by the project applicant using indoor water use factors provided by MPWMD and outdoor water use estimated using the procedures of the State Model Water-Efficient Landscape Ordinance[1] (Kane, 2014). Indoor water use is for 24 market-rate single-family homes plus seven inclusionary homes. Those values are summarized in **Table 1**.

[1] Information on the State Model Water Efficient Landscape Ordinance is available on the California Department of Water Resources website: http://www.water.ca.gov/wateruseefficiency/landscapeordinance/

Table 1. Estimated Average Annual Water Use after Project Completion

Water Use Item	Number of Residences	Number of Bathrooms	Water Demand Factor (AFY)[1]	Annual Water Use (AFY)
Indoor Use				
Single family	24	2.5	0.201	4.82
Inclusionary type 1	3	2	0.101	0.30
Inclusionary type 2	4	1.5	0.081	0.32
Total				5.45
Landscape Irrigation -- entire site[2]				1.09
Water treatment and system losses -- entire site[3]				0.76
Total water use				7.30

AFY = acre-feet per year

[1] Based on water demand factors per plumbing fixture. Factors are those used by MPWMD as of 2007 except that the factor for single-family residential toilets is scaled down from 1.6 to 1.28 gallons per flush. Single-family residences will have 2 bathtubs, 1 shower, 3 wash basins, 3 toilets, 1 kitchen sink, 1 laundry sink and 1 bar sink. Three inclusionary residences will have 2 bathtubs, 1 shower, 2 washbasins, 2 toilets and 1 kitchen sink. Four inclusionary residences will have 1 bathtub with shower, 2 washbasins, 2 toilets and 1 kitchen sink.

[2] Applicant's estimate, assuming 53,980 square feet of irrigated area,annual ET_0 of 49.7 inches, a plant factor of 0.2, effective precipitation equal to 10 percent of ET_0, and an irrigation efficiency of 85 percent (Kane, 2014).

[3] Average of estimates by Monterey County Health Department and MPWMD in 2009 decreased to reflect the smaller number of dwelling units and irrigated landscape area in the current project description (see text).

Indoor residential water use would average 5.45 AFY. The consumption per dwelling unit is based on the number and types of fixtures, as presented by the applicant.

The landscape irrigation water use estimate is based on a detailed site plan with a total irrigated area of 53,980 square feet, or 15 percent of the total site area (Kane, 2014). The site plan estimated annual irrigation demand using reference evapotranspiration (ET_0) equal to 49.7 in/yr, effective precipitation equal to 10 percent of annual ET_0, a plant factor (crop coefficient) equal to 0.2 year-round, and an irrigation efficiency of 85 percent. The resulting estimate of annual water use was 1.09 AFY. However, several factors in the analysis warrant reconsideration, and reasonable alternative assumptions and data values could substantially alter the estimated irrigation demand for the project. These are as follows:

1. **Type of vegetation.** The water use estimate assumed that all of the irrigated vegetation would consist of drought-tolerant groundcovers, shrubs and trees that are in the “very low” category of water use according to the Water Use Classification of Landscape Species (Costello and Jones, 1999). This category is assigned a “plant factor” of 0.2, and irrigation demand is directly

proportional to the plant factor. It may be optimistic to assume that homeowners would not want a certain amount of landscaping that is more verdant.

2. **Irrigation method and efficiency.** Plants in the "very low" water use category are drought-tolerant shrubs, which are almost always irrigated by drip hoses. The efficiency of drip irrigation is much higher than for sprinkler irrigation. An efficiency of 95 percent would be a reasonable assumption.
3. **Effective precipitation.** Because of their relatively large root depth and low plant factor, drought-tolerant shrubs meet much of their annual evapotranspiration demand from rainfall stored in the root zone. The "10 percent of ET_0" rule of thumb might be appropriate for plants with higher irrigation requirements but underestimates the use of rainfall by drought-tolerant vegetation.
4. **Irrigated area.** The water use estimate was based on a detailed but concept-level site map that assumed irrigation would occur only along strips of ground along the side and rear lot boundaries. No irrigation was assumed between the house and the street. This pattern would be very unconventional and not likely appealing to prospective home buyers. Furthermore, the assumed total irrigated area was only 1.24 acres, or 15 percent of the total project site. Allowing for the area occupied by streets, houses and other impervious surfaces, non-irrigated vegetation would occupy 3.46 acres, or three times the amount of irrigated landscaping. This contrasts sharply with landscaping in the Mission Fields development across Highway 1, where lot sizes are similar to those proposed for Carmel Rio, lawns are ubiquitous, and nearly all landscaping appears to be irrigated in aerial photographs.
5. **Reference evapotranspiration.** Irrigation requirements are driven by several climatic variables, which are typically consolidated into a single factor called reference evapotranspiration (ET_0). Estimated irrigation water use is directly proportional to ET_0. The water use estimate by Kane (2014) assumed an annual ET_0 value of 49.7 inches, which corresponds to Zone 6 in a statewide map of climate zones published by the California Irrigation Management Information System (CIMIS) (Jones, 1999). However, the Carmel Rio site is actually in Zone 1, which occupies a strip along the coast. The influence of cool marine air—particularly in summer—greatly reduces ET_0. The annual value for Zone 1 is only 33.0 inches. Fortuitously, a California Department of Water Resources CIMIS climate station has been in operation in the lower Carmel Valley since 2008, and data for that site confirm the steep coastal gradient in ET_0. Average ET_0 at the station is 40.0 in/yr, and the station is twice as far inland as the Carmel Rio site. Thus, ET_0 at Carmel Rio is probably in the neighborhood of 37 in/yr.

Alternative estimates of irrigation demand that incorporate different assumptions regarding average plant factor, effective precipitation, ET_0 and irrigation efficiency were developed using a soil moisture balance model. The model concurrently simulates groundwater recharge (from rainfall and irrigation deep percolation) and was applied to a range of vegetation types. The modeling is described below under "Groundwater Balance and Carmel River Percolation" and was used to obtain pumping and recharge estimates for the calculation of net consumptive water use.

Water treatment consumes a small amount of water for back-flushing filters, and water distribution systems inevitably leak to some extent. In 2009, Monterey County Health Department and MPWMD

estimated treatment would consume 0.52-0.75 AFY and system losses would amount to 0.45 AFY (Bierman, 2009b). However, the project description at that time included 31 single-family market-rate homes and 11 inclusionary affordable homes. The treatment and pipe-leak losses would be proportional to the number of residences and annual volume of residential water use. The current project description includes 24 single-family and 7 inclusionary homes, and water use is expected to be about 70 percent as large as for the original project description. The original loss estimates were decreased in proportion to the decrease in water use, resulting in an estimate of 0.76 AFY for treatment and system losses combined.

The sum of the applicant's estimates of indoor and irrigation water use and the scaled-down estimate of treatment and leakage losses is 7.30 AFY, or 64 percent of baseline water use. If the estimate of irrigation use were doubled—per the discussion of possible errors above—total water use would be 8.39 AFY, which is 73 percent of baseline water use. Because water use would decrease relative to baseline conditions, there would be no long-term adverse impacts directly related to well pumping. However, this does not preclude the possibility of short-term impacts related to pumping rates during the peak demand month or individual pumping cycles. Also, groundwater recharge would decrease under project conditions, so there remains a possibility that net consumptive use of groundwater would increase and thereby adversely impact Carmel River base flow. These issues are explored below.

PEAK WATER USE

Drawdown at Nearby Wells

To obtain a Water Distribution System permit, MPWMD requires an evaluation of drawdown impacts on neighboring wells. These impacts are greatest during periods of above-average pumping. If water use for the proposed project were more strongly seasonal than water use for baseline agricultural conditions, or if individual pumping cycles were longer than for crop irrigation, then short-term drawdown at neighboring wells could potentially be greater than under baseline conditions even if annual water use is smaller.

Records of monthly historical water use on the site are not available (only annual use is recorded), but a conservative assumption is that crops were grown year-round and that the monthly pattern of irrigation followed the monthly pattern of net irrigation demand. Non-irrigation uses including indoor use, water treatment and system losses are relatively constant year-round. **Table 2** shows the estimated monthly patterns of water use under baseline and project conditions, given these assumptions. Under baseline conditions the maximum monthly water use was 1.93 acre-feet in July. Under project conditions, the maximum would be 0.78 acre-feet, also in July. Thus, maximum monthly water use would decrease by more than half under project conditions.

The duration of individual pumping cycles would also be less under project conditions. Residential water use follows a fairly constant diurnal pattern, so wells typically operate about the same number of hours each day. Each daily pumping cycle would produce approximately one-thirtieth of the monthly volume. In contrast, crops do not need irrigating every day. An irrigation interval of 7 days would be typical in July. If the grower divided the site into four crops, there would be a total of roughly 16 irrigation events each month. Each irrigation event would produce one-sixteenth of the monthly volume. Thus, the duration of individual pumping cycles would decrease under project conditions.

The location of pumping would change under the project. Under baseline conditions, 90 percent of groundwater produced by on-site wells was pumped from the Old Travers well, whereas nearly 100 percent would be pumped from the Gamboa Replacement well following project construction (see Figure 1). Consequently, the center of pumping would be shifted 465 feet to the south. At both locations, wells produce groundwater from the Carmel Valley Alluvial Aquifer. The Old Travers well was screened from 90 to 130 feet below ground surface in material described as "river sand and gravel" on the well completion report. The Gamboa Replacement well is screened from 80 to 160 feet below ground surface in "sand, gravels and cobbles". The well completion reports do not reveal any major confining layers within the aquifer. The similar screen depths and alluvial textures indicate that the two wells tap the same aquifer.

The impact of the project on water-level drawdown at nearby wells is the net effect of changes in pumping location and duration of individual pumping cycles. These factors are listed in **Table 3**, along with estimated drawdown at nearby wells at the end of each pumping cycle. Drawdowns were calculated for this investigation using the non-equilibrium formula for wells in confined aquifers (Theis, 1935). Results are shown only for neighboring wells that are closer to the Gamboa Replacement well than they were to the Old Travers well, putting them at risk of increased drawdown. Calculated drawdowns in all cases are small (less than 0.02 foot), mainly because the aquifer storage coefficient is large enough to supply the pumped water from a relatively small radius around the pumping well for the 1-4 hours of pumping duration. Also, the shorter duration of pumping cycles under project conditions more than offset the smaller distance to the potentially impacted wells. In other words, the small drawdowns at neighboring wells under baseline conditions would become even smaller under project conditions.

Table 3. Drawdown at Nearby Wells at end of Pumping Cycle under Baseline and Project Conditions

Table 2. Drawdown at Nearby Wells at end of Pumping Cycle under Baseline and Project Conditions

Drawdown Factor	Baseline Conditions		Project Conditions	
Maximum monthly production (AF)	1.93		0.78	
Pumping cycles per month	16		31	
Volume per pumping cycle (gallons)	39,306		8,199	
Well pumping rate (gpm)	150		150	
Pumping cycle duration (hours)	4.37		0.91	
Aquifer transmissivity (gpd/ft)	4750		4750	
Aquifer storage coefficient (dimensionless)	0.026		0.026	
Drawdown at nearby wells at end of pumping cycle (ft)	Distance to well (ft)	Drawdown (ft)	Distance to well (ft)	Drawdown (ft)
Carmel Presbyterian Church	565	0.0128	400	0.0002
Howe	620	0.0073	410	0.0002
Russell	730	0.0020	340	0.0010
Emerson	780	0.0009	390	0.0003
"Not reported"	642	0.0055	440	0.0001

In summary, the impact of the project on groundwater levels would be less than under baseline conditions at all neighboring well locations and at all time scales ranging from a single pumping cycle to an average year.

Adequacy of Water System Flow Capacity

MPWMD requires that the capacity of wells supplying a water distribution system be sufficient to meet peak day demand with no more than 12 hours of pumping. Fire flows at Carmel Rio would be supplied by a connection to an off-site regional water distribution system and thus do not need to be added to the flow capacity requirement for the on-site wells.[2] The target well capacity in gallons per minute (gpm) is estimated by converting the average annual water demand to a continuous pumping rate, multiplying that by 1.5 to obtain the maximum day continuous pumping rate, and doubling that number to obtain the equivalent 12-hour pumping rate. Under project conditions, average annual water demand would be 7.73 AFY, and the corresponding maximum-day 12-hour pumping rate would be 14.4 gpm. MPWMD specifies procedures for calculating the theoretical yield of a well based on several factors, and those calculations produced estimates exceeding 1,000 gallons per minute for the Old Travers and Gamboa Replacement wells (Marks, 2009). A more realistic estimate of the actual pumping rate is the rate at which the Gamboa Replacement and Old Travers wells operated during an 8-hour constant-rate pumping tests in 2008, which was 150 gpm (Bierman Hydrogeologic, 2009a). That rate exceeds the required rate by a factor of ten. Given a similar diameter and screened interval, the New Travers well would pump almost certainly at a rate substantially greater than the required rate. Serving in a backup role, the New Travers well would be capable of supplying the maximum day demand pumping 12 hours per day if the Gamboa Replacement well were off-line for any reason. Therefore, pumping capacity for the project would be adequate.

GROUNDWATER BALANCE AND CARMEL RIVER PERCOLATION

Change in Net Consumptive Water Use

The impact of the project on the water balance of the Carmel Valley alluvial aquifer and on flow in the Carmel River stems from the change in net consumptive use of groundwater at the project site. Net consumptive use is the amount of groundwater pumping minus the amount of groundwater recharge. The preceding sections demonstrated that the change in pumping by itself would not adversely impact groundwater levels. However, if the project caused a large decrease in on-site groundwater recharge, the overall groundwater balance could become more negative. The effects of such a change in water balance would spread off-site and could potentially lower groundwater levels beneath the Carmel River, which passes 1,100 feet south of the site. This could induce additional percolation from the river.

Groundwater recharge at the site depends on the amount of impervious area, the amount of irrigated area, the characteristics of irrigated and non-irrigated vegetation, the disposition of stormwater runoff and the presence of septic systems. Interactions among some of these variables are complex, and a soil-moisture-balance model was used to simulate the various land covers on the site. The model simulates the hydrologic processes of rainfall, interception, runoff, infiltration, evapotranspiration, irrigation, root zone soil moisture storage, and deep percolation (groundwater recharge). The model has been used to prepare groundwater recharge estimates and time series input for groundwater models in several Central Coast basins (Todd Groundwater, 2015). The model simulates the processes continuously on a daily basis, and water years 1984-2010 were selected for this analysis. This period includes wet and dry

[2] Empirical studies have found that average annual fire-fighting water use is 210 gallons per year per residence for unsprinklered buildings (Code Consultants, Inc., 2012). For the 31 Carmel Rio residences that would amount to 0.02 AFY. The addition of this small demand is not likely to significantly impact the reliability of the regional system.

periods and is long enough to represent long-term average conditions. Daily rainfall from the gage at San Clemente Dam and daily ET_0 from the Carmel Valley CIMIS station were both scaled to match long-term averages at the Carmel Rio site. ET_0 varies much less than rainfall from year to year, so it was reasonable to obtain daily values of ET_0 for the pre-CIMIS period (1984-2007) by replicating the data for 2008-2015.

Each type of land cover present on the site under existing and project conditions was simulated in one dimension, and the resulting recharge rate was multiplied by land cover area to obtain volumetric estimates of average annual applied irrigation water and groundwater recharge in acre-feet per year. Under existing conditions, the small amount of impervious area was assumed to be "disconnected", which means runoff does not flow to a storm drain system but rather flows onto adjacent pervious soils, where it typically ponds in a small area and contributes much more infiltration than the rain falling directly on that area. The additional infiltration can quickly fill the soil-moisture capacity of the soil and initiate deep percolation, which becomes groundwater recharge. A conservative estimate is that 20 percent of this impervious runoff is retained as soil moisture storage and 80 percent percolates through the root zone. Under project conditions, roads and parking lots were assumed to flow to a piped storm drain system that discharges into the Carmel River and leaves the valley. None of it was assumed to become groundwater recharge. Those "connected" areas account for 1.84 acres, or 54 percent of total impervious area. Runoff from rooftops, driveways, patios and walkways (1.58 acres) was assumed to be "disconnected".

Results of the soil-moisture-budget simulations are shown in **Table 4**. Groundwater recharge from pipe leaks and the one existing on-site septic systems are included, so that the table presents a complete picture of groundwater recharge at the Carmel Rio site under baseline and project conditions. Groundwater recharge under irrigated areas includes water derived from rainfall and from irrigation. Simulated irrigation of the baseline period truck crops was within a few percent of the measured historical irrigation pumping. For the simulation of irrigated landscape vegetation, the irrigated area and summer plant factor were as specified by the applicant. However, annual ET_0 was 37.0 inches, root depth was 36 inches, and irrigation efficiency was 95 percent (assuming drip irrigation). The vegetation draws on rainfall stored in the root zone during winter and spring. Irrigation events were simulated whenever soil moisture storage dropped below 30 percent of available water capacity. The existing rural residence was estimated to use 0.5 AFY of water—which is the value assumed for rural residences in the September Ranch decision—of which half was assumed to be for irrigation. The other half was assumed to be indoor use that flowed to the septic system and became groundwater recharge.

The simulated net impact of the project on groundwater recharge was a decrease of 1.92 AFY. Net consumptive use of groundwater under project conditions was 3.16 AFY, or 53 percent of the baseline value.

This net result is strongly affected by assumptions regarding irrigation and stormwater management under project conditions. If the landscape vegetation includes lawns, flowers and shrubs with higher plant factors, several variables in the soil moisture balance model would be affected, including root depth, plant factor, irrigation threshold, and irrigation efficiency. Those variables affect rainfall recharge in addition to irrigation demand and irrigation return flow. The model was used to simulate vegetation corresponding to three plant factors, and simulated irrigation, recharge and net consumptive use were all essentially linear functions of plant factor. To illustrate the change in variables, a plant factor of 0.8 (lawn) was assigned a root depth of 18 inches, irrigation threshold of 70 percent of available water

Table 4. Net Consumptive Use of Groundwater under Baseline and Project Conditions

PUMPING							
	Baseline			Project			
		Pumping			Plant	Pumping	
Land Cover	Area (ac)	(in/yr)	(AF/yr)	Area (ac)	Factor	(in/yr)	(AF/yr)
Baseline water use			11.47				
Project indoor use							5.45
Water treatment and pipe leaks							0.76
Landscape irrigation				1.24	0.20	5.59	0.58
Total			**11.47**				**6.79**

RECHARGE							
	Baseline			Project			
		Recharge			Plant	Recharge	
Land Cover	Area (ac)	(in/yr)	(AF/yr)	Area (ac)	Factor	(in/yr)	(AF/yr)
Irrigated truck crops	5.52	10.23	4.71	0.00		10.23	0.00
Irrigated lawn	0.02	15.99	0.03	0.00		15.99	0.00
Irrigated xeriscape	0.00	8.72	0.00	1.24	0.20	5.31	0.55
Non-irrigated natural vegetation	2.26	0.73	0.14	3.46		1.93	0.56
Connected impervious			0.00	1.84			0.00
Disconnected impervious	0.32		0.42	1.58			2.08
Water system leaks	n/a	n/a	0.00	n/a		n/a	0.45
Septic system recharge	n/a	n/a	0.25	n/a		n/a	0.00
Total	8.12		**5.54**	8.12			**3.63**

NET CONSUMPTIVE USE							
Volume (AF/yr)			**5.93**				**3.16**
Percent of baseline							53%

capacity, and an irrigation efficiency of 75 percent (sprinkler). With these relationships, the maximum plant factor and/or irrigated area that could be implemented without exceeding the significance threshold for net consumptive groundwater use was determined. The significance thresholds are different for CEQA analysis than for state and local policy compliance, as described in the following sections.

Impact Evaluation for CEQA

Environmental impact analysis under the California Environmental Quality Act (CEQA) compares physical environmental conditions that would result if a project were implemented with existing environmental conditions. For the Carmel Rio project, existing conditions with respect to groundwater are the conditions present during the baseline period. As described above, the recommended baseline period is 1995-2004. The key variable with respect to water quantity is net consumptive use of groundwater. If the project would increase net consumptive use, seepage losses from the Carmel River would tend to increase, which would adversely affect fish. Because fish populations in the watershed are already stressed, any increase in net consumptive use would be significant. Even a *de minimus* increase would be significantly adverse. Conversely, any decrease would be beneficial.

The preceding paragraphs concluded that net consumptive use would decrease under project conditions. This conclusion was based on simulated landscape irrigation and recharge for a plant factor of 0.2 and on the assumption that rainfall runoff from streets and driveways is connected to a piped storm drainage system while rainfall runoff from rooftops, patios and walkways is not.

The irrigation assumptions were adjusted to identify the maximum amount of landscape irrigation that could be allowed without increasing net consumptive use above the baseline level. The amount of irrigated area was held constant, and the average plant factor of the vegetation was increased until overall project net consumptive use equaled baseline net consumptive use.[3] Simulation results showed that the plant factor could be increased to as much as 1.0 (pasture) without causing net consumptive use of groundwater to exceed baseline conditions. If the estimated irrigated area is increased to 25 percent of the project site, the average plant factor could be as high as 0.84 (lawn) without causing an increase in net consumptive use of groundwater over baseline conditions.

Thus, it appears that even with more realistic estimates of landscape irrigated area and vegetation type, the project would not increase net consumptive use of groundwater over baseline levels.

Compliance with State and Local Water Management Policies

The State of California adopted a Model Water Efficient Landscape Ordinance that provides formulas for calculating the Maximum Applied Water Allowance (MAWA) and the Estimated Total Water Use (ETWU) for residential landscape irrigation (CCR Title 23, Div. 2, Ch. 2.7 Sections 490 et. seq.). The calculated MAWA for the project site is 2.33 AFY, and the ETWU is 0.80 AFY[4]. Therefore, the proposed landscaping complies with the ordinance.

Revisions to the Monterey County General Plan in 2010 included the addition of policies PS-3.1 and PS-3.2. Policy PS-3.1 states that new development for which a discretionary permit is required must demonstrate by specific evidence and findings that there is a long-term, sustainable water supply available for the project. Policy PS-3.2 lists specific factors to be used in determining the availability of such a supply. The factor most relevant to the Carmel Rio project is "cumulative impacts of existing and projected future demand for water from the source, and the ability to reverse trends contributing to an overdraft condition or otherwise affecting supply." The source for the Carmel Rio project is the Carmel Valley Alluvial Aquifer (CVAA). The CVAA has not been declared to be in overdraft. Groundwater levels still recover to a "full" level by the end of winter in most years. However, groundwater extractions during the rest of the year deplete Carmel River base flow and adversely impact fish.

A single development project cannot be expected to reverse a regional historical trend caused by all pumpers in the valley. However, it can be expected to contribute its share toward reversing the adverse condition. It is the role of local water management agencies to determine how much an individual project needs to contribute toward a collective solution, based on analysis that evaluates the cumulative

[3] Key parameters for the calculations include the following: Total irrigated area = 53,980 square feet (Kane 2014); average annual rainfall and reference ET at the site are 17.93 and 37.0 inches per year, respectively; the average root depth of irrigated vegetation decreases from 36 inches for a plant factor of 0.2 to 18 inches for plant factors greater than or equal to 0.8; irrigation efficiency decreases from 95 percent for a plant factor of 0.2 to 75 percent for a plant factor of 0.8.

[4] Factors for the calculations include: ET0 = 37.0 in/yr; effective precipitation = 25% of annual precipitation = 4.48 in/yr; plant factor = 0.2; landscape area = 53,980 square feet; special landscape area = 0 square feet; irrigation efficiency = 95 percent.

effect of many projects on the hydrologic system. Toward that end, Monterey Peninsula Water Management District's Water Supply Planning Committee developed a draft policy in July 2016 specifying that proposed developments in Carmel Valley must decrease net consumptive use of groundwater by 25 percent relative to baseline conditions.

The simulated net consumptive use for the project with the applicant's proposed landscape vegetation would be 53 percent of the baseline amount (see Table 4) and therefore would comply with local water management policies. The plant factor could be increased to as much as 0.74 while still meeting this target. This corresponds to a mix of lawn, flowers and typical shrubs. However, the simulated annual irrigation volume for that plant factor slightly exceeds the MAWA (2.87 versus 2.33 AFY). The average plant factor would have to be at most 0.59 to comply with the State Model Landscape Ordinance. This corresponds to typical flowers and shrubs but little lawn area. If the irrigated area is increased to 25 percent of the total site, the maximum plant factor that would meet the MPWMD ordinance would be 0.48, which corresponds to typical shrubs with no lawn. This is also the maximum plant factor that would comply with the State Model Landscape Ordinance. Therefore, the project could decrease net consumptive use of groundwater to 75 percent of baseline use with landscaping more lush than proposed by the applicant but with less lawn than in nearby residential areas.

Additional reductions in net consumptive use of groundwater could be achieved by percolating rainfall runoff from streets and driveways in roadside drainage swales. This type of stormwater management is an example of "low impact development", or LID. To estimate the additional groundwater recharge benefit from LID stormwater management, unpaved drainage swales were assumed to be present along both sides of Val Verde Drive and the loop road within the project site. Assuming a flow width of 2 feet, the total percolation area of the swales would be 10,187 square feet, or about one-ninth of the area of pavement and driveways draining to the swales. The percolation capacity of the Metz sandy loam soils is at least 14 inches per day (Natural Resources Conservation Service, Web Soil Survey on-line at http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm accessed 28 July 2016). Evaporation of depression storage on paved surfaces was assumed to be 0.06 inch for each day of rain (or total rainfall that day, whichever is less). There are an average of 59 rainy days each year in Carmel Valley, so annual loss to evaporation of depression storage averages about 3.0 inches. Net available runoff is thus 14.93 inches. Furthermore, rain that falls at intensities greater than the percolation capacity of the swales would simply flow through the swales and out to the Carmel River without percolating. Given the ratio of pavement area to swale area and the losses to depression storage, the swales could infiltrate rainfall up to 1.66 inch per day, or 0.069 inch per hour. A comparison of hourly and daily rainfall for the Salinas 2E gage—scaled to the Carmel Rio location—indicated that 71 percent of annual rainfall occurs at intensities less than or equal to 0.069 inch per hour. Multiplying these factors by the 1.84 acres of street and driveway surfaces produced an estimate of 1.67 AFY of additional groundwater recharge that would result by implementing the LID stormwater design. This LID recharge would decrease net consumptive use at the project site by an additional 28 percent of the baseline amount.

Comparison with Alternative Baseline Periods

The above consumptive use calculations assumed the 1995-2004 baseline period, which is considered most representative of pre-development conditions. For comparison, calculations were also done for the 2005-2014 and 1994-2014 periods. Both of those periods include the five years when cropland at the site was fallow (2005-2009). Noting that groundwater recharge also changes under fallow conditions, the average net consumptive use amounts for the two alternative periods was calculated. The maximum plant factor that could be allowed in the proposed irrigated area while still achieving a 25

percent decrease in net consumptive use was then identified. For the 2005-2014 baseline period, completely eliminating landscape irrigation would not be sufficient to achieve a 25 percent reduction in consumptive use. If LID stormwater management were implemented, the proposed irrigated area could be planted with a maximum plant factor of 0.59, which corresponds to flowers and traditional shrubs but little or no lawn. For the 1994-2014 baseline period, a maximum plant factor of 0.32 would be needed to achieve a 25 percent reduction in net consumptive use. This corresponds to a mix of xeriscape and traditional shrubs.

WATER QUALITY

Water quality at the Gamboa Replacement well met all primary drinking water standards when it was tested in 2008, except that it tested positive for coliform bacteria (Bierman Hydrogeologic, 2009a; Marks, 2009). Bacteria can generally be eliminated by disinfecting the well and do not represent a long-term water-quality issue. Two constituents regulated under secondary drinking water standards that reflect aesthetics and consumer acceptability greatly exceeded the secondary MCLs: iron and manganese. Elevated concentrations of these minerals are common in Central Coast groundwater basins, and they are usually remedied by treatment at the wellhead. The applicant is planning to install a treatment system such as the Filtronics EM-1 ion-exchange package treatment system (Bierman Hydrogeologic, 2011), which is capable of bringing the delivered water quality into compliance with all drinking water standards.

Water quality data are not yet available for the New Travers well, which would serve as the backup to the Gamboa Replacement well. However, the well is located only 67 feet from the Gamboa Replacement well, so the water quality is assumed to be nearly identical. This assertion is supported by data from the Old Travers well, which is seven times farther away and had water quality substantially similar to the Gamboa Replacement well (Bierman Hydrogeologic, 2009a).

In summary, assuming the Gamboa Replacement well is disinfected and an iron and manganese treatment unit is installed and operated, delivered water quality should meet all drinking water standards and thus not adversely impact public health.

SUMMARY AND CONCLUSIONS

Groundwater pumping at the Carmel Rio site after development would be less than under baseline conditions for all time scales ranging from single pumping cycles to annual. Using simulation results for irrigated landscaping proposed by the applicant, average annual water use at the site after development would be 6.79 AFY, or about 59 percent of baseline use.

Drawdown impacts at nearby wells would be less than under baseline conditions even though the location of pumping would shift from primarily near the north edge of the site (Old Travers well) to the southeastern part of the site (Gamboa Replacement well). Available data indicate that groundwater quality will meet drinking water standards if treatment is provided to remove iron and manganese and if wells and piping are disinfected prior commencing water deliveries.

The capacities of the Gamboa Replacement well and New Travers well—which would serve as the primary and backup wells for the water distribution system—are large enough to easily meet peak day demand pumping only 12 hours per day.

Groundwater recharge at the site would decrease as a result of the project. Net consumptive use of groundwater with the landscaping proposed by the applicant would be 3.16 AFY, or 53 percent of baseline consumptive use. This complies with the State Model Landscape Ordinance, meets the target specified in local water management policies (75 percent of baseline or less) and is a beneficial impact under CEQA. Landscape vegetation could include flowers and traditional shrubbery, possibly some lawn and/or an increase in irrigated area and still meet the MAWA, MPWMD policy and CEQA criteria.

Additional groundwater recharge could be achieved by percolating rainfall runoff from streets and driveways in roadside swales. The estimated recharge (1.67 AFY) would further reduce net consumptive use of groundwater by 28 percent of the baseline amount.

Water quality concerns at the existing supply well (coliform, iron and manganese) are readily addressed through treatment. Assuming the project water system incorporates treatment facilities, the delivered water quality would meet drinking water standards.

REFERENCES CITED

Bierman Hydrogeologic. January 30, 2009a. Two 8-hour constant-rate well pumping and aquifer recovery tests with pumping impact assessment for Travers and Gamboa wells. Aptos, CA. Prepared for Carmel Rio Road LLC, Sand City, CA.

Bierman Hydrogeologic. September 24, 2009b. Report addendum for Val Verde Mutual Water Company. Aptos, CA. Prepared for Carmel Rio Road LLC, Sand City, CA.

Bierman Hydrogeologic. March 4, 2010. Letter to Monterey County Resource Management Agency addressing MCRMA comments on Carmel Rio project dated September 17, 2009.

Bierman Hydrogeologic. October 24, 2011. Letter to Monterey County Resource Management Agency addressing MCRMA comments on Carmel Rio project dated September 29, 2011.

California-American Water Company (Cal-Am). April 2015. Cal-Am Monterey Peninsula water supply project. Draft Environmental Impact Report. Monterey, CA

Costello, L.R. and K.S. Jones. 1999. WUCOLS III, 1999 edition. University of California Cooperative Extension. Half Moon Bay, CA.

Hampson, L. September 2, 2015. Carmel Rio water distribution system: MPWMD response to existing water use and request on a production baseline. Letter to Brian Clark, project applicant. MPWMD, Monterey, CA.

Jones, D.W. 1999. California Irrigation Management Information System (CIMIS) reference evapotranspiration. Statewide map. California Department of Water Resources, Sacramento, CA.

Kane, Anita. March 25, 2014. Val Verde preliminary site plan and irrigation water calculations. Hollister, CA.

Marks, R. February 25, 2009. Review of well source and pumping impact assessment for Travers and Gamboa wells, APN 015-021-015, -020 and -021. Technical memorandum. Pueblo Water Resources, Inc., Ventura, CA. Prepared for Monterey Peninsula Water Management District, Monterey, CA.

Theis, C.V. 1935. The relation between the lowering of the piezometric surface and the rate and duration of discharge of a well using groundwater storage. Trans. Amer. Geophysical Union 2:519-524.

Todd Groundwater. June 2015. Northern San Benito County groundwater model update and enhancement. Alameda, CA. Prepared for San Benito County Water District, Hollister, CA.

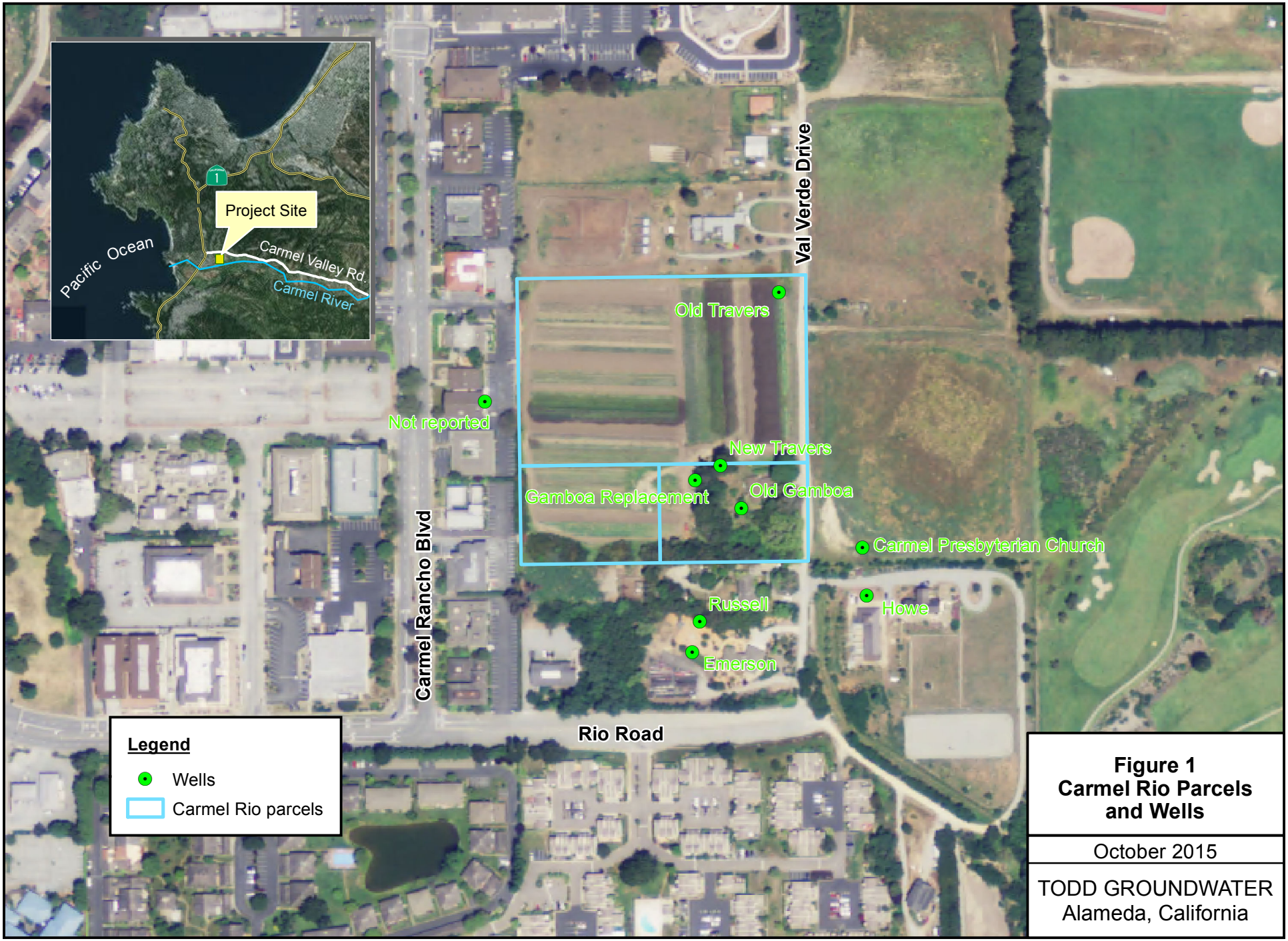


Figure 1
Carmel Rio Parcels and Wells

October 2015

TODD GROUNDWATER
Alameda, California

Table 2. Monthly Pattern of Groundwater Pumping under Baseline and Project Conditions

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Irrigation factors													
Eto (in)	1.77	1.94	3.09	3.93	4.23	4.30	4.20	3.96	3.49	2.86	1.82	1.40	37.00
Rain (in)	4.46	3.32	3.2	1.45	0.5	0.18	0.06	0.08	0.24	0.85	2.07	3.32	19.73
Net ETo (in)	0.00	0.00	0.00	2.48	3.73	4.12	4.14	3.88	3.25	2.01	0.00	0.00	23.61
Net ETo (% of annual)	0%	0%	0%	11%	16%	17%	18%	16%	14%	9%	0%	0%	100%
Baseline water use (AF)													
Irrigation	0.00	0.00	0.00	1.15	1.73	1.92	1.92	1.80	1.51	0.93	0.00	0.00	10.97
Residence	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.50
Total	0.04	0.04	0.04	1.19	1.77	1.96	1.97	1.84	1.55	0.98	0.04	0.04	11.47
Project water use (AF)													
Irrigation	0.00	0.00	0.00	0.06	0.09	0.10	0.10	0.10	0.08	0.05	0.00	0.00	0.58
Indoor	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	5.45
Treatment and losses	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.76
Total	0.52	0.52	0.52	0.58	0.61	0.62	0.62	0.61	0.60	0.57	0.52	0.52	6.79

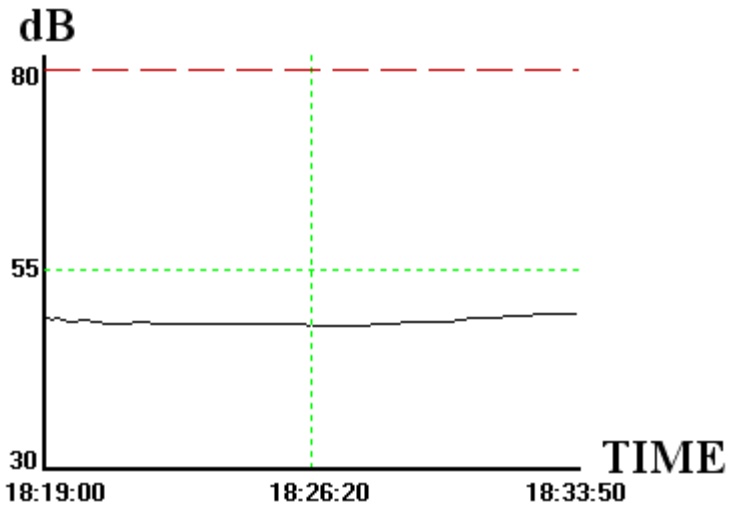
Appendix H

Sound Level Measurements

Date Time=11/04/15 18:19:00
Sampling Time=10
Record Num= 90
Leq Value=49.4   SEL Value=78.9
MAX Value=63.0
MIN Value=43.7
Freq Weighting=A   Time Weighting=Fast
49.1,18:19:00,
48.7,18:19:10,
48.8,18:19:20,
48.6,18:19:30,
48.5,18:19:40,
48.4,18:19:50,
48.7,18:20:00,
48.7,18:20:10,
48.5,18:20:20,
48.3,18:20:30,
48.1,18:20:40,
48.1,18:20:50,
48.1,18:21:00,
48.2,18:21:10,
48.2,18:21:20,
48.3,18:21:30,
48.3,18:21:40,
48.3,18:21:50,
48.2,18:22:00,
48.1,18:22:10,
48.1,18:22:20,
48.1,18:22:30,
48.1,18:22:40,
48.1,18:22:50,
48.1,18:23:00,
48.2,18:23:10,
48.2,18:23:20,
48.2,18:23:30,
48.1,18:23:40,
48.2,18:23:50,
48.2,18:24:00,
48.2,18:24:10,
48.2,18:24:20,
48.2,18:24:30,
48.2,18:24:40,
48.2,18:24:50,
48.2,18:25:00,
48.2,18:25:10,
48.2,18:25:20,
48.2,18:25:30,
48.1,18:25:40,
48.1,18:25:50,
48.1,18:26:00,
48.1,18:26:10,
48.0,18:26:20,
48.0,18:26:30,
48.0,18:26:40,
48.0,18:26:50,
48.0,18:27:00,
48.0,18:27:10,
48.0,18:27:20,
48.0,18:27:30,
48.0,18:27:40,
48.0,18:27:50,
48.0,18:28:00,
48.1,18:28:10,
48.1,18:28:20,
48.1,18:28:30,
48.1,18:28:40,
48.2,18:28:50,
48.3,18:29:00,
48.4,18:29:10,
48.4,18:29:20,
48.4,18:29:30,
48.4,18:29:40,
48.4,18:29:50,
48.5,18:30:00,
48.5,18:30:10,
48.5,18:30:20,
48.6,18:30:30,
48.7,18:30:40,
49.0,18:30:50,

```
49.0,18:31:00,
49.0,18:31:10,
49.0,18:31:20,
49.0,18:31:30,
49.0,18:31:40,
49.1,18:31:50,
49.1,18:32:00,
49.1,18:32:10,
49.1,18:32:20,
49.2,18:32:30,
49.3,18:32:40,
49.3,18:32:50,
49.3,18:33:00,
49.4,18:33:10,
49.4,18:33:20,
49.4,18:33:30,
49.4,18:33:40,
49.4,18:33:50,
```

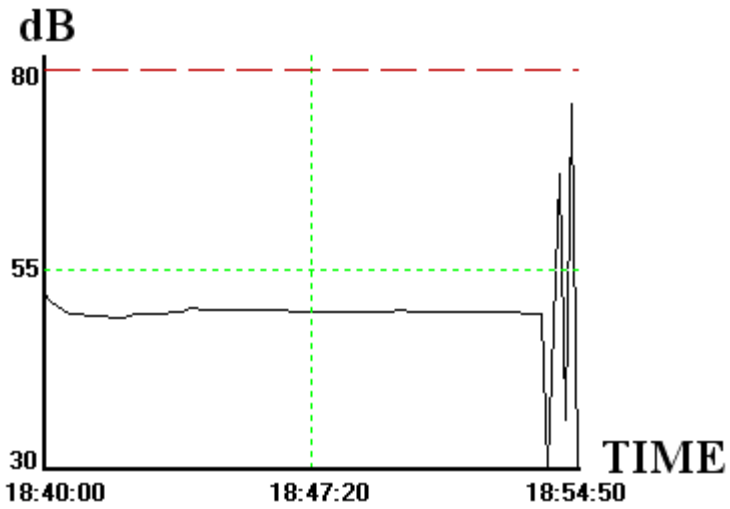
Ln	1	2	3	4	5	6	7	8	9
L(00)	49.4	49.4	49.4	49.4	49.4	49.3	49.3	49.3	49.2
L(10)	49.1	49.1	49.1	49.1	49.1	49.0	49.0	49.0	49.0
L(20)	49.0	49.0	48.8	48.7	48.7	48.7	48.7	48.6	48.6
L(30)	48.5	48.5	48.5	48.5	48.5	48.4	48.4	48.4	48.4
L(40)	48.4	48.3	48.3	48.3	48.3	48.3	48.3	48.2	48.2
L(50)	48.2	48.2	48.2	48.2	48.2	48.2	48.2	48.2	48.2
L(60)	48.2	48.2	48.2	48.2	48.2	48.2	48.2	48.1	48.1
L(70)	48.1	48.1	48.1	48.1	48.1	48.1	48.1	48.1	48.1
L(80)	48.1	48.1	48.1	48.1	48.1	48.1	48.0	48.0	48.0
L(90)	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0


dB
80
55
30
TIME
18:19:00
18:26:20
18:33:50

Date Time=11/04/15 18:40:00
Sampling Time=10
Record Num= 90
Leq Value=49.4   SEL Value=79.0
MAX Value=59.4
MIN Value=45.6
Freq Weighting=A   Time Weighting=Fast
51.8,18:40:00,
50.8,18:40:10,
50.3,18:40:20,
49.9,18:40:30,
49.5,18:40:40,
49.4,18:40:50,
49.3,18:41:00,
49.2,18:41:10,
49.1,18:41:20,
49.1,18:41:30,
49.1,18:41:40,
48.9,18:41:50,
48.9,18:42:00,
48.9,18:42:10,
49.1,18:42:20,
49.3,18:42:30,
49.4,18:42:40,
49.4,18:42:50,
49.4,18:43:00,
49.5,18:43:10,
49.5,18:43:20,
49.6,18:43:30,
49.6,18:43:40,
49.7,18:43:50,
50.1,18:44:00,
50.1,18:44:10,
50.0,18:44:20,
50.0,18:44:30,
49.9,18:44:40,
49.9,18:44:50,
49.9,18:45:00,
49.9,18:45:10,
49.8,18:45:20,
49.8,18:45:30,
49.8,18:45:40,
49.9,18:45:50,
49.9,18:46:00,
49.9,18:46:10,
49.8,18:46:20,
49.8,18:46:30,
49.8,18:46:40,
49.7,18:46:50,
49.7,18:47:00,
49.7,18:47:10,
49.7,18:47:20,
49.7,18:47:30,
49.7,18:47:40,
49.7,18:47:50,
49.6,18:48:00,
49.6,18:48:10,
49.6,18:48:20,
49.6,18:48:30,
49.6,18:48:40,
49.7,18:48:50,
49.7,18:49:00,
49.7,18:49:10,
49.7,18:49:20,
49.7,18:49:30,
49.7,18:49:40,
49.8,18:49:50,
49.8,18:50:00,
49.7,18:50:10,
49.7,18:50:20,
49.7,18:50:30,
49.7,18:50:40,
49.7,18:50:50,
49.6,18:51:00,
49.6,18:51:10,
49.6,18:51:20,
49.6,18:51:30,
49.6,18:51:40,
49.6,18:51:50,

49.6,18:52:00,
49.6,18:52:10,
49.6,18:52:20,
49.6,18:52:30,
49.6,18:52:40,
49.6,18:52:50,
49.6,18:53:00,
49.6,18:53:10,
49.5,18:53:20,
49.5,18:53:30,
49.5,18:53:40,
49.5,18:53:50,
0.0,18:54:00,
48.0,18:54:10,
66.8,18:54:20,
36.2,18:54:30,
75.7,18:54:40,
0.0,18:54:50,

Ln	1	2	3	4	5	6	7	8	9
L(00)	75.7	66.8	51.8	50.8	50.3	50.1	50.1	50.0	50.0
L(10)	49.9	49.9	49.9	49.9	49.9	49.9	49.9	49.9	49.8
L(20)	49.8	49.8	49.8	49.8	49.8	49.8	49.8	49.7	49.7
L(30)	49.7	49.7	49.7	49.7	49.7	49.7	49.7	49.7	49.7
L(40)	49.7	49.7	49.7	49.7	49.7	49.7	49.7	49.7	49.6
L(50)	49.6	49.6	49.6	49.6	49.6	49.6	49.6	49.6	49.6
L(60)	49.6	49.6	49.6	49.6	49.6	49.6	49.6	49.6	49.6
L(70)	49.6	49.5	49.5	49.5	49.5	49.5	49.5	49.5	49.5
L(80)	49.4	49.4	49.4	49.3	49.3	49.2	49.1	49.1	49.1
L(90)	49.1	48.9	48.9	48.9	48.0	36.2	0.0	0.0	0.0


dB
80
55
30
TIME
18:40:00
18:47:20
18:54:50

AMBIENT NOISE SURVEY DATA SHEET

Project: Carmel Rio Road EIR Job Number: 14-00187
Date: 11/4/15
Operator: Chris Bersbach

Station: A	Begin: 4:25pm
Measurement No. 1	Finish: 4:40pm
Wind: <5 mph	Direction: NE
Temperature: 65	

Cloud Cover Class

Daytime
- ☐ 1 - Overcast >80%
- ☐ 2 - Light 20-80%
- ☒ 3 - Sunny <20%

Nighttime
- ☐ 4 - Clear <50%
- ☐ 5 - Overcast >50%

Primary Noise Source: Val Verde Dr. / Carmel Valley Rd / Hwy 1
Distance: 15ft from Val Verde Dr.
Secondary Noise Sources: Carmel Middle School
Notes: Occassional wind gusts around 7mph
Traffic *LDA/T*: 1
MDT:
HDT:

Leq:	49.4	L(10):	
Lmin:		L(33):	
Lmax:		L(50):	
Peak:		L(90):	

Calibration Start: 94 dB
End: 94 dB

Response: ☐ Slow ☒ Fast ☐ Peak ☐ Impulse

Weighting: ☒ A ☐ B ☐ C ☐ Linear

Octave Filter: ☐ NA ☐ _____ Hz

Station: B	Begin: 4:50
Measurement No. 2	Finish: 5:05
Wind: <5 mph	Direction: NE
Temperature: 65	

Cloud Cover Class

Daytime
- ☐ 1 - Overcast >80%
- ☐ 2 - Light 20-80%
- ☒ 3 - Sunny <20%

Nighttime
- ☐ 4 - Clear <50%
- ☐ 5 - Overcast >50%

Primary Noise Source: Carmel Rancho Blvd & parking lot
Distance: ~25ft from parking lot as well as other roadways incl. Carmel Valley Rd & Hwy 1
Secondary Noise Sources: → Carmel Middle School
Notes: occassional wind gusts around 7mph
Traffic *LDA/T*: (no adjacent roadways)
MDT:
HDT:

Leq:	49.4	L(10):	
Lmin:		L(33):	
Lmax:		L(50):	
Peak:		L(90):	

Calibration Start: 94 dB
End: 94 dB

Response: ☐ Slow ☒ Fast ☐ Peak ☐ Impulse

Weighting: ☒ A ☐ B ☐ C ☐ Linear

Octave Filter: ☐ NA ☐ _____ Hz

Station B
Station A
Rancho Laundry
Fremont Bank
Santa Barbara Bank & Trust
Chase Bank
Clock Tower Pl
Charles Schwab
Carmel Rancho Blvd
Via Nona
Limousine Service in Carmel
Royal Alliance Associates
Salon Aubergine
US Post Office
Flowers Limited
Val Verde Dr
Google
Sign in
Map
Imagery ©2015 Google, Map data ©2015 Google
Terms
Privacy
Send feedback
100 ft

Appendix I

Traffic Impact Analysis

Hatch Mott MacDonald

VAL VERDE SUBDIVISION
TRAFFIC IMPACT ANALYSIS

DRAFT REPORT

MONTEREY COUNTY, CALIFORNIA

Prepared for

Carmel Rio Road, LLC

June 16, 2016

This document has been prepared for the titled project or named part thereof and should not be relied upon or used for any other project without an independent check being carried out as to its suitability and prior written authority of Hatch Mott MacDonald being obtained. Hatch Mott MacDonald accepts no responsibility or liability for the consequences of this document being used for a purpose other than the purposes for which it was commissioned. Any person using or relying on the document for such other purposes agrees, and will by such use or reliance be taken to confirm his agreement, to indemnify Hatch Mott MacDonald for all loss or damage resulting therefrom. Hatch Mott MacDonald accepts no responsibility or liability for this document to any party other than the person by whom it was commissioned.

To the extent that this report is based on information supplied by other parties, Hatch Mott MacDonald accepts no liability for any loss or damage suffered by the client, whether contractual or tortious, stemming from any conclusions based on data supplied by parties other than Hatch Mott MacDonald and used by Hatch Mott MacDonald in preparing this report.

Table of Contents

1 Executive Summary 1
1.1 Project Relationship to SB 743 2
1.2 Existing Plus Proposed Project Conditions 3
1.3 Background Plus Proposed Project Conditions 4
1.4 Cumulative Plus Proposed Project Conditions 5
1.5 Existing Plus Project Alternative 1 Conditions 7
1.6 Background Plus Project Alternative 1 Conditions 7
1.7 Cumulative Plus Project Alternative 1 Conditions 8
1.8 Existing Plus Project Alternative 2 Conditions 10
1.9 Background Plus Project Alternative 2 Conditions 11
1.10 Cumulative Plus Project Alternative 2 Conditions 12

2 Introduction..... 14
2.1 Project Description 14
2.2 Scope of Work 14
2.3 Traffic Operation Evaluation Methodologies and Level of Service Standards 15
2.4 Criteria for Project Impacts 17
2.5 Funding for Transportation Improvements 19

3 Existing Traffic Conditions..... 21
3.1 Existing Roadway Network 21
3.2 Existing Bicycle, Pedestrian and Transit Facilities 21
3.3 Existing Intersection Operations 22
3.4 Existing Road Segment Operations 23

4 Proposed Project Trip Generation, Distribution and Assignment 24
4.1 Proposed Project Trip Generation 24
4.2 Proposed Project Trip Distribution 24
4.3 Proposed Project Trip Assignment 24

5 Existing Plus Proposed Project Traffic Conditions 25
5.1 Existing Plus Proposed Project Traffic Volumes 25
5.2 Existing Plus Proposed Project Intersection Operations 25

Table of Contents (continued)

5.3 Existing Plus Proposed Project Road Segment Operations 26
5.4 Project Relationship to SB 743 29

6 Background Traffic Conditions 29
6.1 Background Traffic Volumes 29
6.2 Background Intersection Operations 29
6.3 Background Road Segment Operations 29

7 Background Plus Proposed Project Traffic Conditions 31
7.1 Background Plus Proposed Project Traffic Volumes 31
7.2 Background Plus Proposed Project Intersection Operations 31
7.3 Background Plus Proposed Project Road Segment Operations 32

8 Cumulative Traffic Conditions 36
8.1 Cumulative Roadway Network 36
8.2 2035 Cumulative Traffic Volume Forecasts 36
8.3 Cumulative Intersection Operations 36
8.4 Cumulative Road Segment Operations 37

9 Cumulative Plus Proposed Project Traffic Conditions 38
9.1 Cumulative Plus Proposed Project Intersection Operations 38
9.2 Cumulative Plus Proposed Project Road Segment Operations 40

10 Alternatives Analysis 44
10.1 Project Alternative 1 Trip Generation 44
10.2 Project Alternative 1 Intersection Operations 44
10.3 Project Alternative 1 Road Segment Operations 45
10.4 Project Alternative 2 Trip Generation 45
10.5 Project Alternative 2 Intersection Operations 46
10.6 Project Alternative 2 Road Segment Operations 46

Exhibits

1. Proposed Project Location Map
2. Proposed Project Site Plan
3. Study Intersections
4. Existing Conditions AM & PM Peak Hour Volumes
5. Proposed Project Scenarios Intersection Level of Service Summary Table
6. Proposed Project Scenarios Road Segment Levels of Service (Segments #1 – #5 and #11 – #15)
7. Proposed Project Scenarios Road Segment Levels of Service (Segments #6 – #10)
8. Proposed Project Trip Generation
9. Proposed Project Trip Distribution
10. Proposed Project Trip Assignment AM & PM Peak Hour Volumes
11. Existing Plus Proposed Project Conditions AM & PM Peak Hour Volumes
12. Background Conditions AM & PM Peak Hour Volumes
13. Background Plus Proposed Project Conditions AM & PM Peak Hour Volumes
14. Cumulative Conditions AM & PM Peak Hour Volumes
15. Cumulative Plus Proposed Project Conditions AM & PM Peak Hour Volumes
16. Project Alternatives 1 and 2 Trip Generation Estimates
17. Project Alternative 1 Trip Assignment
18. Existing Plus Project Alternative 1 AM & PM Peak Hour Volumes
19. Background Plus Project Alternative 1 AM & PM Peak Hour Volumes
20. Cumulative Plus Project Alternative 1 AM & PM Peak Hour Volumes
21. Project Alternative 1 Scenarios Intersection Levels of Service
22. Project Alternative 1 Scenarios Road Segment Levels of Service (Segments #1 – #5 and #11 – #15)
23. Project Alternative 1 Scenarios Road Segment Levels of Service (Segments #6 – #10)
24. Project Alternative 2 Trip Assignment
25. Existing Plus Project Alternative 2 AM & PM Peak Hour Volumes
26. Background Plus Project Alternative 2 AM & PM Peak Hour Volumes
27. Cumulative Plus Project Alternative 2 AM & PM Peak Hour Volumes
28. Project Alternative 2 Scenarios Intersection Levels of Service
29. Project Alternative 2 Scenarios Road Segment Levels of Service (Segments #1 – #5 and #11 – #15)
30. Project Alternative 2 Scenarios Road Segment Levels of Service (Segments #6 – #10)

Appendices

A LOS Descriptions for Signalized Intersections

B LOS Descriptions for Unsignalized Intersections

C LOS Descriptions for Road Segments – HCM Exhibits 14-4, 15-2, 15-3

D New Raw Counts & New vs. Previously Published Volumes – Comparison and Adjustments

E Proposed Project Scenarios Intersection Level of Service Calculation Worksheets

F Proposed Project Scenarios Road Segment Level of Service Calculation Worksheets

G Approved Projects Trip Generation

H Approved Projects Location Map

I Cumulative Projects Trip Generation

J Cumulative Projects Location Map

K AMBAG Model Plots

L Project Alternative Scenarios Intersection Level of Service Calculation Worksheets

M Project Alternative Scenarios Road Segment Level of Service Calculation Worksheets

1 Executive Summary

This traffic study evaluates the potential traffic impacts associated with the development of the Val Verde Subdivision project located on the west side of Val Verde Drive and north of Rio Road in Carmel Valley, Monterey County, California.

The Proposed Project consists of 31 residential dwelling units. Twenty-four of these units will be market rate, single-family detached homes, and 7 will be inclusionary housing units (condos or apartments). There is one existing single-family dwelling unit on the site that would be replaced by the 31 new residential units. Access to the project site would be via two driveways on Val Verde Drive.

This study also evaluates the potential traffic impacts associated with two Project Alternatives. Project Alternative 1 involves the development of a 200-bed assisted living facility on the project site. Project Alternative 2, a scaled down version of Project Alternative 1, involves the development of a 150-bed assisted living facility.

This following intersections and road segments were analyzed during the weekday morning (7:00 – 9:00 a.m.) and evening (4:00 – 6:00 p.m.) time periods.

Intersections:

1. State Route (SR) 1 / Carmel Valley Road
2. Carmel Rancho Boulevard / Carmel Valley Road
3. Rio Road / SR 1
4. Crossroads Boulevard / Rio Road
5. Carmel Center Place / Rio Road
6. Carmel Rancho Boulevard / Rio Road
7. SR 1 / Ocean Avenue
8. SR 1 / Carpenter Street
9. Carmel Rancho Boulevard / Shopping Center Driveway

Road Segments:

1. SR 1, Carpenter Street to Ocean Avenue
2. SR 1, Ocean Avenue to Carmel Valley Road
3. SR 1, Carmel Valley Road to Rio Road
4. SR 1, Rio Road to Ribera Road
5. Rio Road, west of SR 1
6. Carmel Valley Road, Robinson Canyon Road to Schulte Road
7. Carmel Valley Road, Schulte Road to Rancho San Carlos Road
8. Carmel Valley Road, Rancho San Carlos Road to Rio Road
9. Carmel Valley Road, Rio Road to Carmel Rancho Boulevard
10. Carmel Valley Road, Carmel Rancho Boulevard to SR 1
11. Carmel Rancho Boulevard, Carmel Valley Road to Shopping Center Driveway
12. Carmel Rancho Boulevard, Shopping Center Driveway to Rio Road
13. Rio Road, SR 1 to Crossroads Boulevard
14. Rio Road, Crossroads Boulevard to Carmel Center Place
15. Rio Road, Carmel Center Place to Carmel Rancho Boulevard

The study intersections and road segments were analyzed under the following development scenarios for the Proposed Project and Project Alternatives 1 and 2:

1. Existing Conditions
2. Existing Plus Project Conditions
3. Background Conditions
4. Background Plus Project Conditions
5. Cumulative Conditions
6. Cumulative Plus Project Conditions

The traffic impacts associated with the Proposed Project and Project Alternatives 1 and 2, and potential mitigations for those impacts, are described below.

1.1 Project Relationship to SB 743

On September 27, 2013, Governor Brown signed Senate Bill (SB) 743 (Steinberg, 2013), which creates a process to change the way that transportation impacts are analyzed under CEQA. SB 743 supports AB 32, the California Global Warming Solutions Act of 2006, and SB 375, the Sustainable Communities and Climate Protection Act of 2008, which call for substantial reductions in greenhouse gas (GHG) emissions. SB 743 mandates a change in the way that public agencies evaluate transportation impacts of projects under CEQA. Under the new CEQA Guidelines, aspects of project location and design that influence travel choices, and thereby improve or degrade air quality, safety, and health, must be considered. The new CEQA Guidelines will eliminate the use of automobile delay, including Level of Service (LOS), in evaluating transportation impacts and replace it with Vehicle Miles Traveled (VMT), based on a goal of reducing statewide GHG emissions by 15% by the year 2020.

The new CEQA Guidelines will measure whether a project contributes to various state goals, such as reducing greenhouse gas emissions (GHG), developing multimodal transportation, preserving open spaces, and promoting diverse land uses and infill development. Projects that are shown to decrease vehicle miles traveled — for example, bike lanes or pedestrian paths, or a grocery store that allows local residents to travel shorter distances to shop — may be automatically considered to have a “less than significant” impact under CEQA. Under the new CEQA Guidelines, projects may be able to mitigate transportation impacts by funding better transit, creating better access to transit, designing more walkable communities, or implementing other improvements that increase travel choices.

The cities of San Francisco and Pasadena have already modified their local environmental review process by removing automobile delay (i.e., Level of Service) and replacing it with Vehicle Miles Traveled when determining significant traffic impacts on the environment pursuant to CEQA. The statewide revisions to the CEQA Guidelines are expected to be completed in about one year, and the implementation of the revised guidelines may be phased in over the course of two years.

A VMT analysis has not been performed for the Val Verde Subdivision project. However, the project has a unique location that is in close proximity to three major shopping centers (i.e., The Barnyard, Crossroads and Carmel Rancho Shopping Centers) and public transportation. The Proposed Project likely would meet the primary goal of SB 743 by reducing VMT and greenhouse gas emissions.

The project site is located in close proximity to a wide variety of public-serving businesses, including the following:

- Grocery Stores: 3
- Banks: 5
- Restaurants: 14
- Coffee Shops: 3
- Bakery: 2
- Post Office: 1
- Brokerage Houses: 2
- Gas Stations: 2
- Hair Salons: 3
- Hardware Stores: 2
- Pet Supply and Vet Services: 3
- Clothing & Jewelry Stores: 8
- Various Home Decorator Stores: 6
- Title Companies: 2
- Real Estate Offices: 3
- Doctors and Dentists: 7
- Copy Center: 1
- Book Store: 1
- Liquor Stores: 4
- Law Offices: 3
- Galleries: 3

All of the businesses listed above are within about an 8 to 18-minute walk of the proposed project. In addition, there are four transit stops in the project area, providing access to County-wide public transportation.

1.2 Existing Plus Proposed Project Conditions

Intersections

Int. #3 – SR 1 / Rio Road
This intersection operates at a deficient LOS D during the PM peak hour and traffic generated by the project is expected to increase the average delay by 0.1 seconds. Based on the Caltrans impact criteria the project would have an impact. Participating in funding improvements in the TAMC Regional Transportation Plan (RTP) could potentially eliminate the project's impacts. However, funding for these improvements is not guaranteed.

Int. #7 – SR 1 / Ocean Avenue
This intersection operates at a deficient LOS D during the AM and PM peak hours and traffic generated by the project is expected to increase the average delay by 0.5 and 0.4 seconds during the AM and PM peak hours, respectively. Based on the Caltrans impact criteria the project would have an impact. There are no known planned or feasible improvements at this intersection.

Int. #8 – SR 1 / Carpenter Street
This intersection operates at a deficient LOS D during the PM peak hour and traffic generated by the project is expected to increase the average delay by 0.3 seconds. Based on the Caltrans impact criteria the project would have an impact. Implementing a dedicated northbound SR 1 right-turn lane at this intersection would eliminate the project's impacts.

Road Segments

Seg. #1 SR 1 between Carpenter Street and Ocean Avenue
This segment is projected to operate at a deficient LOS D in the northbound (PM) and southbound (AM) directions and the project will add traffic to this segment. Based on the Caltrans impact criteria the project would have an impact. Implementing a dedicated northbound SR 1 right-turn lane at the SR 1 / Carpenter Street intersection would eliminate the project's impacts in the northbound direction. There are no known planned or feasible improvements for this segment in the southbound direction.

Seg. #3 – SR 1 between Carmel Valley Road and Rio Road
This segment operates at a deficient LOS F (AM & PM) in the northbound direction and LOS E (PM) in the southbound direction and the project will add traffic to this segment. Based on the Caltrans impact criteria the project would have an impact. Participating in funding improvements in the TAMC Regional Transportation Plan (RTP) could potentially eliminate the project's impacts in the northbound direction. However, funding for these improvements is not guaranteed. Widening SR 1 would eliminate the project's impacts in the southbound direction; however, this is not considered feasible.

1.3 Background Plus Proposed Project Conditions

Intersections

Int. #3 – SR 1 / Rio Road
This intersection is projected to operate at a deficient LOS D during the PM peak hour and traffic generated by the project is expected to increase the average delay by 0.1 seconds. Based on the Caltrans impact criteria the project would have an impact. Participating in funding improvements in the TAMC Regional Transportation Plan (RTP) could potentially eliminate the project's impacts. However, funding for these improvements is not guaranteed.

Int. #7 – SR 1 / Ocean Avenue
This intersection is projected to operate at a deficient LOS D during the AM and PM peak hours and traffic generated by the project is expected to increase the average delay by 0.5 and 0.6 seconds during the AM and PM peak hours, respectively. Based on the Caltrans impact criteria the project would have an impact. There are no known planned or feasible improvements at this intersection.

Int. #8 – SR 1 / Carpenter Street
This intersection is projected to operate at a deficient LOS D during the PM peak hour and traffic generated by the project is expected to increase the average delay by 0.4 seconds. Based on the Caltrans impact criteria the project would have an impact. Implementing a dedicated northbound SR 1 right-turn lane at this intersection would eliminate the project's impacts.

Road Segments

Seg. #1 – SR 1 between Carpenter Street and Ocean Avenue
This segment is projected to operate at a deficient LOS D in the northbound (PM) and southbound (AM) directions and the project will add traffic to this segment. Based on the Caltrans impact criteria the project would have an impact. Implementing a dedicated northbound SR 1 right-turn lane at the SR 1 / Carpenter Street intersection would eliminate the project's impacts in the northbound direction. There are no known planned or feasible improvements for this segment in the southbound direction.

Seg. #2 SR 1 between Ocean Avenue and Carmel Valley Road
This road segment is projected to operate at a deficient LOS F in the northbound direction during the AM peak hour and the project will add traffic to this segment. Based on the Caltrans impact criteria the project would have an impact. There are no known planned or feasible improvements for this road segment.

Seg. #3 – SR 1 between Carmel Valley Road and Rio Road
This segment is projected to operate at an unacceptable LOS F in the northbound direction during the AM and PM peak hours and LOS E in the southbound direction during the PM peak hour and the project will add

traffic to this segment. Based on the Caltrans impact criteria the project would have an impact. Participating in funding improvements in the TAMC Regional Transportation Plan (RTP) could potentially eliminate the project's impacts**.** However, funding for these improvements is not guaranteed.

Seg. #6 – Carmel Valley Road between Robinson Canyon Road and Schulte Road
The Carmel Valley Master Plan (CVMP) average daily traffic (ADT) thresholds are projected to be exceeded under Background traffic conditions and the project would add traffic to this segment. Based on the CVMP ADT threshold, the project would have an impact. The impacts to segment #6 would be eliminated by widening Carmel Valley Road at this location to four lanes; however, this is not considered feasible.

Seg. #7 – Carmel Valley Road between Schulte Road and Rancho San Carlos Road
The CVMP ADT thresholds are projected to be exceeded under Background traffic conditions and the project would add traffic to this segment. Based on the CVMP ADT threshold, the project would have an impact. The impacts to segment #7 would be eliminated by widening Carmel Valley Road at this location to four lanes; however, this is not considered feasible.

1.4 Cumulative Plus Proposed Project Conditions

Intersections

Int. #1 – SR 1 / Carmel Valley Road
This intersection is projected to operate at a deficient LOS D during the PM peak hour and traffic generated by the project is expected to increase the average delay by 0.5 seconds. Based on the Caltrans impact criteria the project would have a cumulative impact. Both TAMC and Caltrans consider payment of regional development impact fees as mitigation for cumulative impacts to state highways and the regional road network. Therefore, payment of the TAMC fee would mitigate the project's cumulative impacts.

Int. #3 – SR 1 / Rio Road
This intersection is projected to operate at a deficient LOS D during the PM peak hour and traffic generated by the project is expected to increase the average delay by 0.4 seconds. Based on the Caltrans impact criteria the project would have a cumulative impact. Both TAMC and Caltrans consider payment of regional development impact fees as mitigation for cumulative impacts to state highways and the regional road network. Therefore, payment of the TAMC fee would mitigate the project's cumulative impacts.

Int. #7 – SR 1 / Ocean Avenue
This intersection is projected to operate at a deficient LOS E during the AM and PM peak hours and traffic generated by the project is expected to increase the average delay by 0.4 and 0.9 seconds during the AM and PM peak hours, respectively. Based on the Caltrans impact criteria the project would have a cumulative impact. Both TAMC and Caltrans consider payment of regional development impact fees as mitigation for cumulative impacts to state highways and the regional road network. Therefore, payment of the TAMC fee would mitigate the project's cumulative impacts.

Int. #8 – SR 1 / Carpenter Street
This intersection is projected to operate at a deficient LOS D during the PM peak hour and traffic generated by the project is expected to increase the average delay by 0.4 seconds. Based on the Caltrans impact criteria the project would have a cumulative impact. Both TAMC and Caltrans consider payment of regional development impact fees as mitigation for cumulative impacts to state highways and the regional road network. Therefore, payment of the TAMC fee would mitigate the project's cumulative impacts.

Road Segments

Seg. #1 – SR 1 between Carpenter Street and Ocean Avenue
This segment is projected to operate at a deficient LOS D in the northbound (PM) and southbound (AM) directions and the project will add traffic to this segment. Based on the Caltrans impact criteria the project would have a cumulative impact. Both TAMC and Caltrans consider payment of regional development impact fees as mitigation for cumulative impacts to state highways and the regional road network. Therefore, payment of the TAMC fee would mitigate the project's cumulative impacts.

Seg. #2 SR 1 between Ocean Avenue and Carmel Valley Road
This segment is projected to operate at an unacceptable LOS F in the northbound direction during the AM peak hour and the project will add traffic to this segment. Based on the Caltrans impact criteria, the Proposed Project would have a cumulative impact. Both TAMC and Caltrans consider payment of regional development impact fees as mitigation for cumulative impacts to state highways and the regional road network. Therefore, payment of the TAMC fee would mitigate the project's cumulative impacts.

Seg. #3 – SR 1 between Carmel Valley Road and Rio Road
This segment is projected to operate at a deficient LOS F (AM & PM) in the northbound and LOS E (PM) in the southbound direction and the project will add traffic to this segment. Based on the Caltrans impact criteria the project would have a cumulative impact. Both TAMC and Caltrans consider payment of regional development impact fees as mitigation for cumulative impacts to state highways and the regional road network. Therefore, payment of the TAMC fee would mitigate the project's cumulative impacts.

Seg. #6 – Carmel Valley Road between Robinson Canyon Road and Schulte Road
The CVMP ADT thresholds are projected to be exceeded under Background and Cumulative traffic conditions and the project would add traffic to this segment. Based on the CVMP ADT threshold, the project would have an impact. The impacts to segment #6 would be eliminated by widening Carmel Valley Road at this location to four lanes; however, this is not considered feasible.

Seg. #7 – Carmel Valley Road between Schulte Road and Rancho San Carlos Road
The CVMP ADT thresholds are projected to be exceeded under Background and Cumulative traffic conditions and the project would add traffic to this segment. Based on the CVMP ADT threshold, the project would have an impact. The impacts to segment #7 would be eliminated by widening Carmel Valley Road at this location to four lanes; however, this is not considered feasible.

Seg. #13 – Rio Road between SR 1 and Crossroads Boulevard
This segment is projected to operate at a deficient LOS F (PM) in the westbound direction without the project. Traffic generated by the project is not expected to decrease the average travel speed; however, any traffic added to a segment operating at LOS F is considered an impact. Participating in funding improvements in the TAMC Regional Transportation Plan (RTP) could potentially eliminate the project's impacts. However, funding for these improvements is not guaranteed.

Seg. #14 – Rio Road between Crossroads Boulevard and Carmel Center Place
This segment is projected to operate at a deficient LOS F (AM & PM) in the westbound direction without the project. Traffic generated by the project is not expected to decrease the average travel speed; however, any traffic added to a segment operating at LOS F is considered a potential impact. However, this road segment is bounded by two closely spaced signalized intersections (approximately 220 feet

apart), and the flow of traffic on this segment is controlled by the adjacent signal operations, which are projected to operate at an acceptable LOS C and LOS A under Cumulative Plus Proposed Project conditions. As a result, the Proposed Project is not expected to have an impact on this segment.

1.5 Existing Plus Project Alternative 1 Conditions

Intersections

Int. #7 – SR 1 / Ocean Avenue
This intersection is projected to operate at a deficient LOS D during the AM and PM peak hours and traffic generated by the project is expected to increase the average delay by 0.1 and 0.2 seconds during the AM and PM peak hours, respectively. Based on the Caltrans impact criteria the project would have an impact. There are no known planned or feasible improvements at this intersection.

Int. #8 – SR 1 / Carpenter Street
This intersection is projected to operate at a deficient LOS D during the PM peak hour and traffic generated by the project is expected to increase the average delay by 0.2 seconds. Based on the Caltrans impact criteria the project would have an impact. Implementing a dedicated northbound SR 1 right-turn lane at this intersection would eliminate the project's impacts.

Road Segments

Seg. #1 SR 1 between Carpenter Street and Ocean Avenue
This segment is projected to operate at a deficient LOS D in the northbound (PM) and southbound (AM) directions and the project will add traffic to this segment. Based on the Caltrans impact criteria the project would have an impact. Implementing a dedicated northbound SR 1 right-turn lane at the SR 1 / Carpenter Street intersection would eliminate the project's impacts in the northbound direction. There are no known planned or feasible improvements for this segment in the southbound direction.

Seg. #3 – SR 1 between Carmel Valley Road and Rio Road
This segment operates at a deficient LOS F (AM & PM) in the northbound direction and LOS E (PM) in the southbound direction and the project will add traffic to this segment. Based on the Caltrans impact criteria the project would have an impact. Participating in funding improvements in the TAMC Regional Transportation Plan (RTP) could potentially eliminate the project's impacts in the northbound direction. However, funding for these improvements is not guaranteed. Widening SR 1 would eliminate the project's impacts in the southbound direction; however, this is not considered feasible.

1.6 Background Plus Project Alternative 1 Conditions

Intersections

Int. #7 – SR 1 / Ocean Avenue
This intersection is projected to operate at a deficient LOS D during the AM and PM peak hours and traffic generated by the project is expected to increase the average delay by 0.1 and 0.3 seconds during the AM and PM peak hours, respectively. Based on the Caltrans impact criteria the project would have an impact. There are no known planned or feasible improvements at this intersection.

Int. #8 – SR 1 / Carpenter Street
This intersection is projected to operate at a deficient LOS D during the PM peak hour and traffic generated by the project is expected to increase the average delay by 0.2 seconds. Based on the Caltrans impact criteria the project would have an impact. Implementing a dedicated northbound SR 1 right-turn lane at this intersection would eliminate the project's impacts.

Road Segments

Seg. #1 – SR 1 between Carpenter Street and Ocean Avenue
This segment is projected to operate at a deficient LOS D in the northbound (PM) and southbound (AM) directions and the project will add traffic to this segment. Based on the Caltrans impact criteria the project would have an impact. Implementing a dedicated northbound SR 1 right-turn lane at the SR 1 / Carpenter Street intersection would eliminate the project's impacts in the northbound direction. There are no known planned or feasible improvements for this segment in the southbound direction.

Seg. #2 SR 1 between Ocean Avenue and Carmel Valley Road
This segment is projected to operate at a deficient LOS F in the northbound direction during the AM peak hour and the project will add traffic to this segment. Based on the Caltrans impact criteria the project would have an impact. There are no known planned or feasible improvements for this road segment.

Seg. #3 SR 1 between Carmel Valley Road and Rio Road
This segment is projected to operate at an unacceptable LOS F in the northbound direction during the AM and PM peak hours and LOS E in the southbound direction during the PM peak hour and the project will add traffic to this segment. Based on the Caltrans impact criteria the project would have an impact. Participating in funding improvements in the TAMC Regional Transportation Plan (RTP) could potentially eliminate the project's impacts**.** However, funding for these improvements is not guaranteed.

Seg. #6 – Carmel Valley Road between Robinson Canyon Road and Schulte Road
The CVMP ADT thresholds are projected to be exceeded under Background traffic conditions and the project would add traffic to this segment. Based on the CVMP ADT threshold, the project would have an impact. The impacts to segment #6 would be eliminated by widening Carmel Valley Road at this location to four lanes; however, this is not considered feasible.

Seg. #7 – Carmel Valley Road between Schulte Road and Rancho San Carlos Road
The CVMP ADT thresholds are projected to be exceeded under Background traffic conditions and the project would add traffic to this segment. Based on the CVMP ADT threshold, the project would have an impact. The impacts to segment #7 would be eliminated by widening Carmel Valley Road at this location to four lanes; however, this is not considered feasible.

1.7 Cumulative Plus Project Alternative 1 Conditions

Intersections

Int. #1 – SR 1 / Carmel Valley Road
This intersection is projected to operate at a deficient LOS D during the PM peak hour and traffic generated by the project is expected to increase the average delay by 0.3 seconds. Based on the Caltrans impact criteria the project would have an impact. Participating in funding improvements in the TAMC Regional Transportation Plan (RTP) could potentially eliminate the project's impacts.

Int. #3 – SR 1 / Rio Road
This intersection is projected to operate at a deficient LOS D during the PM peak hour and traffic generated by the project is expected to increase the average delay by 0.2 seconds. Based on the Caltrans impact criteria the project would have an impact. Participating in funding improvements in the TAMC Regional Transportation Plan (RTP) could potentially eliminate the project's impacts.

Int. #7 – SR 1 / Ocean Avenue
This intersection is projected to operate at a deficient LOS E during the AM and PM peak hours and traffic generated by the project is expected to increase the average delay by 0.1 and 0.4 seconds during the AM and PM peak hours, respectively. Based on the Caltrans impact criteria the project would have an impact. There are no known planned or feasible improvements at this intersection.

Int. #8 – SR 1 / Carpenter Street
This intersection is projected to operate at a deficient LOS E during the PM peak hour and traffic generated by the project is expected to increase the average delay by 0.3 seconds. Based on the Caltrans impact criteria the project would have an impact. Implementing a dedicated northbound SR 1 right-turn lane at this intersection would eliminate the project's impacts.

Road Segments

Seg. #1 – SR 1 between Carpenter Street and Ocean Avenue
This segment is projected to operate at a deficient LOS D in the northbound (PM) and southbound (AM) directions and the project will add traffic to this segment. Based on the Caltrans impact criteria the project would have a cumulative impact. Both TAMC and Caltrans consider payment of regional development impact fees as mitigation for cumulative impacts to state highways and the regional road network. Therefore, payment of the TAMC fee would mitigate the project's cumulative impacts.

Seg. #2 SR 1 between Ocean Avenue and Carmel Valley Road
This segment is projected to operate at an unacceptable LOS F in the northbound direction during the AM peak hour and the project will add traffic to this segment. Based on the Caltrans impact criteria, the Proposed Project would have a cumulative impact. Both TAMC and Caltrans consider payment of regional development impact fees as mitigation for cumulative impacts to state highways and the regional road network. Therefore, payment of the TAMC fee would mitigate the project's cumulative impacts.

Seg. #3 – SR 1 between Carmel Valley Road and Rio Road
This segment is projected to operate at a deficient LOS F (AM & PM) in the northbound and LOS E (PM) in the southbound direction and the project will add traffic to this segment. Based on the Caltrans impact criteria the project would have a cumulative impact. Both TAMC and Caltrans consider payment of regional development impact fees as mitigation for cumulative impacts to state highways and the regional road network. Therefore, payment of the TAMC fee would mitigate the project's cumulative impacts.

Seg. #6 – Carmel Valley Road between Robinson Canyon Road and Schulte Road
The CVMP ADT thresholds are projected to be exceeded under Cumulative traffic conditions and the project would add traffic to this segment. Based on the CVMP ADT threshold, the project would have an impact. The impacts to segment #6 would be eliminated by widening Carmel Valley Road at this location to four lanes; however, this is not considered feasible.

Seg. #7 – Carmel Valley Road between Schulte Road and Rancho San Carlos Road
The CVMP ADT thresholds are projected to be exceeded under Cumulative traffic conditions and the project would add traffic to this segment. Based on the CVMP ADT threshold, the project would have an impact. The impacts to segment #7 would be eliminated by widening Carmel Valley Road at this location to four lanes; however, this is not considered feasible.

Seg. #13 – Rio Road between SR 1 and Crossroads Boulevard
This segment is projected to operate at a deficient LOS F (PM) in the westbound direction without the project. Traffic generated by the project is not expected to decrease the average travel speed; however, any traffic added to a segment operating at LOS F is considered a potential impact. Participating in funding improvements in the TAMC Regional Transportation Plan (RTP) could potentially eliminated the project's impacts.

Seg. #14 – Rio Road between Crossroads Boulevard and Carmel Center Place
This segment is projected to operate at a deficient LOS F (AM & PM) in the westbound direction without the project. Traffic generated by the project is not expected to decrease the average travel speed; however, any traffic added to a segment operating at LOS F is considered a potential impact. However, this road segment is bounded by two closely spaced signalized intersections (approximately 220 feet apart), and the flow of traffic on this segment is controlled by the adjacent signal operations, which are projected to operate at an acceptable LOS C and LOS A under Cumulative Plus Project Alternative 1 conditions. As a result, the project is not expected to have an impact on this segment.

1.8 Existing Plus Project Alternative 2 Conditions

Intersections

Int. #7 – SR 1 / Ocean Avenue
This intersection is projected to operate at a deficient LOS D during the AM and PM peak hours and traffic generated by the project is expected to increase the average delay by 0.1 seconds. Based on the Caltrans impact criteria the project would have an impact. There are no known planned or feasible improvements at this intersection.

Int. #8 – SR 1 / Carpenter Street
This intersection is projected to operate at a deficient LOS D during the PM peak hour and traffic generated by the project is expected to increase the average delay by 0.2 seconds. Based on the Caltrans impact criteria the project would have an impact. Implementing a dedicated northbound SR 1 right-turn lane at this intersection would eliminate the project's impacts.

Road Segments

Seg. #1 SR 1 between Carpenter Street and Ocean Avenue
This segment is projected to operate at a deficient LOS D in the northbound (PM) and southbound (AM) directions and the project will add traffic to this segment. Based on the Caltrans impact criteria the project would have an impact. Implementing a dedicated northbound SR 1 right-turn lane at the SR 1 / Carpenter Street intersection would eliminate the project's impacts in the northbound direction. There are no known planned or feasible improvements for this segment in the southbound direction.

Seg. #3 – SR 1 between Carmel Valley Road and Rio Road
This segment operates at a deficient LOS F (AM & PM) in the northbound direction and LOS E (PM) in the southbound direction and the project will add traffic to this segment. Based on the Caltrans impact criteria the project would have an impact. Participating in funding improvements in the TAMC Regional Transportation Plan (RTP) could potentially eliminate the project's impacts in the northbound direction. However, funding for these improvements is not guaranteed. Widening SR 1 would eliminate the project's impacts in the southbound direction; however, this is not considered feasible.

1.9 Background Plus Project Alternative 2 Conditions

Intersections

Int. #7 – SR 1 / Ocean Avenue
This intersection is projected to operate at a deficient LOS D during the AM and PM peak hours and traffic generated by the project is expected to increase the average delay by 0.1 and 0.2 seconds during the AM and PM peak hours, respectively. Based on the Caltrans impact criteria the project would have an impact. There are no known planned or feasible improvements at this intersection.

Int. #8 – SR 1 / Carpenter Street
This intersection is projected to operate at a deficient LOS D during the PM peak hour and traffic generated by the project is expected to increase the average delay by 0.1 seconds. Based on the Caltrans impact criteria the project would have an impact. Implementing a dedicated northbound SR 1 right-turn lane at this intersection would eliminate the project's impacts.

Road Segments

Seg. #1 – SR 1 between Carpenter Street and Ocean Avenue
This segment is projected to operate at a deficient LOS D in the northbound (PM) and southbound (AM) directions and the project will add traffic to this segment. Based on the Caltrans impact criteria the project would have an impact. Implementing a dedicated northbound SR 1 right-turn lane at the SR 1 / Carpenter Street intersection would eliminate the project's impacts in the northbound direction. There are no known planned or feasible improvements for this segment in the southbound direction.

Seg. #2 SR 1 between Ocean Avenue and Carmel Valley Road
This segment is projected to operate at a deficient LOS F in the northbound direction during the AM peak hour and the project will add traffic to this segment. Based on the Caltrans impact criteria the project would have an impact. There are no known planned or feasible improvements for this road segment.

Seg. #3 SR 1 between Carmel Valley Road and Rio Road
This segment is projected to operate at an unacceptable LOS F in the northbound direction during the AM and PM peak hours and LOS E in the southbound direction during the PM peak hour and the project will add traffic to this segment. Based on the Caltrans impact criteria the project would have an impact. Participating in funding improvements in the TAMC Regional Transportation Plan (RTP) could potentially eliminate the project's impacts**.** However, funding for these improvements is not guaranteed.

Seg. #6 – Carmel Valley Road between Robinson Canyon Road and Schulte Road
The CVMP ADT thresholds are projected to be exceeded under Background traffic conditions and the project would add traffic to this segment. Based on the CVMP ADT threshold, the project would have an impact. The

impacts to segment #6 would be eliminated by widening Carmel Valley Road at this location to four lanes; however, this is not considered feasible.

Seg. #7 – Carmel Valley Road between Schulte Road and Rancho San Carlos Road
The CVMP ADT thresholds are projected to be exceeded under Background traffic conditions and the project would add traffic to this segment. Based on the CVMP ADT threshold, the project would have an impact. The impacts to segment #7 would be eliminated by widening Carmel Valley Road at this location to four lanes; however, this is not considered feasible.

1.10 Cumulative Plus Project Alternative 2 Conditions

Intersections

Int. #1 – SR 1 / Carmel Valley Road
This intersection is projected to operate at a deficient LOS D during the PM peak hour and traffic generated by the project is expected to increase the average delay by 0.2 seconds. Based on the Caltrans impact criteria the project would have an impact. Participating in funding improvements in the TAMC Regional Transportation Plan (RTP) could potentially eliminate the project's impacts.

Int. #3 – SR 1 / Rio Road
This intersection is projected to operate at a deficient LOS D during the PM peak hour and traffic generated by the project is expected to increase the average delay by 0.1 seconds. Based on the Caltrans impact criteria the project would have an impact. Participating in funding improvements in the TAMC Regional Transportation Plan (RTP) could potentially eliminate the project's impacts.

Int. #7 – SR 1 / Ocean Avenue
This intersection is projected to operate at a deficient LOS E during the AM and PM peak hours and traffic generated by the project is expected to increase the average delay by 0.1 and 0.2 seconds during the AM and PM peak hours, respectively. Based on the Caltrans impact criteria the project would have an impact. There are no known planned or feasible improvements at this intersection.

Int. #8 – SR 1 / Carpenter Street
This intersection is projected to operate at a deficient LOS E during the PM peak hour and traffic generated by the project is expected to increase the average delay by 0.2 seconds. Based on the Caltrans impact criteria the project would have an impact. Implementing a dedicated northbound SR 1 right-turn lane at this intersection would eliminate the project's impacts.

Road Segments

Seg. #1 – SR 1 between Carpenter Street and Ocean Avenue
This segment is projected to operate at a deficient LOS D in the northbound (PM) and southbound (AM) directions and the project will add traffic to this segment. Based on the Caltrans impact criteria the project would have a cumulative impact. Both TAMC and Caltrans consider payment of regional development impact fees as mitigation for cumulative impacts to state highways and the regional road network. Therefore, payment of the TAMC fee would mitigate the project's cumulative impacts.

Seg. #2 SR 1 between Ocean Avenue and Carmel Valley Road
This segment is projected to operate at an unacceptable LOS F in the northbound direction during the AM

peak hour and the project will add traffic to this segment. Based on the Caltrans impact criteria, the Proposed Project would have a cumulative impact. Both TAMC and Caltrans consider payment of regional development impact fees as mitigation for cumulative impacts to state highways and the regional road network. Therefore, payment of the TAMC fee would mitigate the project's cumulative impacts.

Seg. #3 – SR 1 between Carmel Valley Road and Rio Road
This segment is projected to operate at a deficient LOS F (AM & PM) in the northbound and LOS E (PM) in the southbound direction and the project will add traffic to this segment. Based on the Caltrans impact criteria the project would have a cumulative impact. Both TAMC and Caltrans consider payment of regional development impact fees as mitigation for cumulative impacts to state highways and the regional road network. Therefore, payment of the TAMC fee would mitigate the project's cumulative impacts.

Seg. #6 – Carmel Valley Road between Robinson Canyon Road and Schulte Road
The CVMP ADT thresholds are projected to be exceeded under Cumulative traffic conditions and the project would add traffic to this segment. Based on the CVMP ADT threshold, the project would have an impact. The impacts to segment #6 would be eliminated by widening Carmel Valley Road at this location to four lanes; however, this is not considered feasible.

Seg. #7 – Carmel Valley Road between Schulte Road and Rancho San Carlos Road
The CVMP ADT thresholds are projected to be exceeded under Cumulative traffic conditions and the project would add traffic to this segment. Based on the CVMP ADT threshold, the project would have an impact. The impacts to segment #7 would be eliminated by widening Carmel Valley Road at this location to four lanes; however, this is not considered feasible.

Seg. #13 – Rio Road between SR 1 and Crossroads Boulevard
This segment is projected to operate at a deficient LOS F (PM) in the westbound direction without the project. Traffic generated by the project is not expected to decrease the average travel speed; however, any traffic added to a segment operating at LOS F is considered a potential impact. Participating in funding improvements in the TAMC Regional Transportation Plan (RTP) could potentially eliminate the project's impacts.

Seg. #14 – Rio Road between Crossroads Boulevard and Carmel Center Place
This segment is projected to operate at a deficient LOS F (AM & PM) in the westbound direction without the project. Traffic generated by the project is not expected to decrease the average travel speed; however, any traffic added to a segment operating at LOS F is considered a potential impact. However, this road segment is bounded by two closely spaced signalized intersections (approximately 220 feet apart), and the flow of traffic on this segment is controlled by the adjacent signal operations, which are projected to operate at an acceptable LOS C and LOS A under Cumulative Plus Project Alternative 2 conditions. As a result, the project is not expected to have an impact on this segment.

2 Introduction

This traffic study was prepared to analyze the impacts associated with the development of the proposed Val Verde Subdivision located on Val Verde Drive in Carmel Valley, Monterey County, California. **Exhibit 1** shows the location of the Proposed Project with respect to the local road network. **Exhibit 2** shows the Proposed Project site plan.

2.1 Project Description

The project site is located on the west side of Val Verde Drive north of Rio Road. The Proposed Project consists of 31 residential dwelling units. Twenty-four of these units will be market rate, single-family detached homes, and 7 will be inclusionary housing units (condos or apartments). There is one existing single-family dwelling unit on the site that would be replaced by the 31 new residential units. Access to the project site would be via two driveways on Val Verde Drive. The project includes the addition of pedestrian and bicycle facilities along the west side of Val Verde Drive.

2.2 Scope of Work

This study analyzes the traffic impacts of the proposed Val Verde Subdivision project on the surrounding roadway network. The study includes the evaluation of the following intersections:

1. State Route (SR) 1 / Carmel Valley Road
2. Carmel Rancho Boulevard / Carmel Valley Road
3. Rio Road / SR 1
4. Crossroads Boulevard / Rio Road
5. Carmel Center Place / Rio Road
6. Carmel Rancho Boulevard / Rio Road
7. SR 1 / Ocean Avenue
8. SR 1 / Carpenter Street
9. Carmel Rancho Boulevard / Shopping Center Driveway

The study includes the evaluation of the following road segments:

1. SR 1, Carpenter Street to Ocean Avenue
2. SR 1, Ocean Avenue to Carmel Valley Road
3. SR 1, Carmel Valley Road to Rio Road
4. SR 1, Rio Road to Ribera Road
5. Rio Road, west of SR 1
6. Carmel Valley Road, Robinson Canyon Road to Schulte Road
7. Carmel Valley Road, Schulte Road to Rancho San Carlos Road
8. Carmel Valley Road, Rancho San Carlos Road to Rio Road
9. Carmel Valley Road, Rio Road to Carmel Rancho Boulevard
10. Carmel Valley Road, Carmel Rancho Boulevard to SR 1
11. Carmel Rancho Boulevard, Carmel Valley Road to Shopping Center Driveway
12. Carmel Rancho Boulevard, Shopping Center Driveway to Rio Road
13. Rio Road, SR 1 to Crossroads Boulevard
14. Rio Road, Crossroads Boulevard to Carmel Center Place
15. Rio Road, Carmel Center Place to Carmel Rancho Boulevard

The study intersections are shown in **Exhibit 3**. Beyond the limits of the study area, the project trips disperse onto numerous local streets or onto regional facilities. The impact of trips that disperse on the local road network lessens as they move away from the project site. The local intersections included in the analysis were identified as potentially having the greatest impact from the project.

Weekday AM and PM peak hour traffic operations were analyzed for the following conditions:

1. Existing Conditions
2. Existing Plus Project Conditions
3. Background Conditions
4. Background Plus Project Conditions
5. Cumulative Conditions
6. Cumulative Plus Project Conditions

2.3 Traffic Operation Evaluation Methodologies and Level of Service Standards

The study area covers the jurisdictions of the County of Monterey and Caltrans, and is within the Carmel Valley Master Plan area. Levels of service standards and analysis methodologies for each jurisdiction and/or planning area have been applied as follows:

Traffic Operation Evaluation Methodologies

Intersection and road segment traffic operations were evaluated based on the Level of Service (LOS) concept, and the LOS standard adopted by the jurisdiction within which the intersection is located. LOS is a quantitative description of an intersection's operation, ranging from LOS A to LOS F. Level of service "A" represents free flow un-congested traffic conditions. Level of service "F" represents highly congested traffic conditions with what is commonly considered unacceptable delay to vehicles at intersections. The intermediate levels of service represent incremental levels of congestion and delay between these two extremes. LOS descriptions for signalized intersections are included as **Appendix A**. LOS descriptions for unsignalized intersections with two-way stop control are included as **Appendix B**.

Intersection traffic operations were evaluated using the Synchro analysis software (Version 8) which is based on the *Highway Capacity Manual (HCM) 2010* methodologies for signalized and un-signalized intersections. HCM 2000 methods were used in cases where the HCM 2010 methods do not allow the analysis of specific lane configurations or signal phasing.

Intersection operations are based upon the average vehicular delay at the intersection. The average delay is then correlated to a level of service. For two-way stop controlled intersections, the vehicle delay for side street traffic is analyzed. LOS for each side street movement is based on the distribution of gaps in the major street traffic stream and driver judgment in selecting gaps. Improvements are warranted when a side street approach reaches LOS F for two-way stop controlled intersections. When using the HCM 2010 and HCM 2000 methods for the analysis of signalized intersections, the overall intersection delay is used to determine LOS.

Per direction from Monterey County Department of Public Works staff, road segment operations for study segments #1 - #4 are referenced from the *Rancho Cañada Draft Transportation Impact Study* prepared by Central Coast Transportation Consulting (CCTC, January 2016). Study segments #1 - #4 are the northbound and southbound segments of SR 1 between Carpenter Street and Ribera Road. These segments were

analyzed by CCTC using National Cooperative Highway Research Program (NCHRP) Report 3-70; *Multi-Modal Level of Service for Urban Streets Methodology*.

Road segment operations for study segments #5 and #11 – #15 were evaluated using the Synchro software arterial analysis module which is based on HCM 2000 methodologies. The arterial LOS is based on the travel speed and Urban Street Class of the roadway as shown in **Appendix C** (HCM 2000 Exhibit 15-2).

Road segment operations for study segments on Carmel Valley Road (segments #6 – #10) were evaluated in accordance with the Carmel Valley Master Plan (CVMP) using Average Daily Traffic (ADT) volumes and HCM 2010 methodologies. The HCM 2010 methods include the evaluation of multi-lane and two-lane highways. The methodology for two-lane highways is based on the "percent time-spent-following" (PTSP), which is correlated to a level of service (HCM 2010 Exhibit 15-3). The HCM 2010 LOS methodology for multi-lane highways is based on vehicle density in passenger cars per mile per lane (pcpmpl). The density is correlated to a level of service (HCM 2010 Exhibit 14-4). HCM 2010 Exhibits 14-4 and 15-3 are provided in **Appendix C**.

The 2010 CVMP also provides the following average daily traffic (ADT) thresholds for segments of Carmel Valley Road. The ADT thresholds for the Carmel Valley Road study segments (#6 – #10) are provided in **Table 1**.

Table 1 – Carmel Valley Road ADT Thresholds

Segment	CVMP Threshold
6. CVR between Robinson Canyon Rd & Schulte Rd	15,499
7. CVR between Schulte Rd & Rancho San Carlos Rd	16,340
8. CVR between Rancho San Carlos Rd & Rio Rd	48,487
9. CVR between Rio Rd & Carmel Rancho Blvd	51,401
10. CVR between Carmel Rancho Blvd & SR 1	27,839

Monterey County Level of Service Standards

The Monterey County General Plan has established LOS D as the minimum acceptable level of service for signalized intersections and road segments. For un-signalized intersections LOS E is considered the maximum acceptable level of service (based on the delay at the worst approach for two-way stop controlled intersections and the average delay at all-way stop and roundabout controlled intersections). All of the intersections in this study fall under the jurisdiction of Caltrans or the Carmel Valley Master Plan. Roadway segment #5 falls under the jurisdiction of Monterey County with an LOS D standard.

Carmel Valley Master Plan Level of Service Standards

With the exception of some road segments along Carmel Valley Road, LOS C has been established as the minimum acceptable level of service for roadways and intersections within Carmel Valley. Per CVMP Policy 2.18, LOS D has been established as the minimum acceptable level of service for several segments along Carmel Valley Road.

Study intersections that fall under the jurisdiction of the Carmel Valley Master Plan with an LOS C standard include intersections #2, #4, #5, #6 and #9. Roadway segments that fall under the jurisdiction of the Carmel

Valley Master Plan with an LOS D standard include segments #6 and #7, while segments #8, #9, #10, #11, #12, #13, #14 and #15 have an LOS C standard.

Caltrans Level of Service Standards

Per the Caltrans *Guide for Preparation of Traffic Impact Studies* publication, "Caltrans endeavors to maintain a target LOS at the transition between LOS "C" and LOS "D" on State highway facilities, however, Caltrans acknowledges that this may not always be feasible and recommends that the lead agency consult with Caltrans to determine the appropriate target LOS. If an existing State highway facility is operating at less than the appropriate target LOS, the existing MOE should be maintained." MOE refers to the measures of effectiveness which are used to describe the measures best suited for analyzing State highway facilities.

Study intersections that fall under the jurisdiction of Caltrans with an LOS C/D standard include intersections #1, #3, #7 and #8. Roadway segments that fall under the jurisdiction of Caltrans with an LOS C/D standard include segments #1, #2, #3 and #4.

2.4 Criteria for Project Impacts

According to the California Environmental Quality Act (CEQA) guidelines, a project may have a significant effect on the environment if it would cause an increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system. In accordance with CEQA, specific impact criteria have been applied to the study intersections and road segments to determine if the project specific increase in traffic is substantial in relation to the existing traffic load and capacity of the street system.

The study area falls within multiple jurisdictions and planning areas, as described in Section 1.3. The impact criteria for the relevant jurisdictions and planning areas are listed below and have been applied to the analysis results.

Monterey County Impact Criteria

An impact at a **signalized study intersection** is defined to occur under the following conditions:

- An impact would occur if an intersection operating at LOS A, B, C, or D degrades by one or more letter grades to LOS E or F. For intersections already operating at LOS E, an impact would occur if operations degrade to LOS F. For intersections already operating at LOS F, the addition of any project traffic to the facility is considered an impact.

An impact at an **unsignalized study intersection** is defined to occur under the following conditions:

- An impact would occur if an **all-way stop controlled** or **roundabout controlled** intersection, based on the average delay, operates at LOS F or any traffic signal warrant is met.

- An impact would occur if a **two-way stop controlled** intersection, based on the worst approach delay, operates at LOS F or any traffic signal warrant is met.

An impact at a **study road segment** is defined to occur under the following conditions:

- An impact would occur if a roadway segment operating at LOS A through LOS E degrades to a lower level of service E or F. If a segment is already operating at LOS F any increase during the peak hour (one vehicle) is considered an impact.

Carmel Valley Master Plan (CVMP) Impact Criteria

The following impact criteria are based on the Monterey County General Plans' Carmel Valley Master Plan (CV 2.17(f)) and apply to study intersections 2, 4, 5, 6 and 9:

An impact at a **signalized study intersection** is defined to occur under the following conditions:

- An impact would occur if an intersection operating at LOS A, B or C degrades by one or more letter grades to LOS D, E or F. If an intersection is already operating at LOS D or E, an impact would occur the LOS degrades by one or more letter grades to LOS E or F. If an intersection is already operating at LOS F, the addition of any project traffic to the facility is considered an impact.

An impact at an **unsignalized study intersection** is defined to occur under the following conditions:

- An impact would occur if an **all-way stop controlled** or **roundabout controlled** intersection, based on the average delay, operates at LOS F or any traffic signal warrant is met.
- An impact would occur if a **two-way stop controlled** intersection, based on the worst approach delay, operates at LOS F or any traffic signal warrant is met.

An impact on a **study road segments #8, #9, #10, #11, #12, #13, #14, #15** would occur if operations degrade from LOS C or better to LOS D, E or F; or if operations degrade on **study road segments #6 or #7** from LOS D or better to LOS E or F; or if project traffic worsens the LOS of a segment operating at LOS E by one letter grade to LOS F; or if project traffic is added to a segment operating at LOS F; or if the CVMP ADT threshold is exceeded.

Caltrans Impact Criteria

Caltrans perceives an impact when there is any degradation in the performance measure below the cusp of C/D. If a facility is currently operating at or below LOS D, then any trips added represent a potential impact, and the performance measure should be brought back to predevelopment conditions. While a single trip added to a degraded facility is not usually reflected in the performance measure, Caltrans reserves the ability to consider a single trip as an impact.

SB 743 Implications

On September 27, 2013, Governor Brown signed Senate Bill (SB) 743 (Steinberg, 2013), which creates a process to change the way that transportation impacts are analyzed under CEQA. SB 743 supports AB 32, the California Global Warming Solutions Act of 2006, and SB 375, the Sustainable Communities and Climate Protection Act of 2008, which call for substantial reductions in greenhouse gas (GHG) emissions. SB 743 mandates a change in the way that public agencies evaluate transportation impacts of projects under CEQA. Under the new CEQA Guidelines, aspects of project location and design that influence travel choices, and thereby improve or degrade air quality, safety, and health, must be considered. The new CEQA Guidelines will eliminate the use of automobile delay, including Level of Service (LOS), in evaluating transportation impacts and replace it with Vehicle Miles Traveled (VMT), based on a goal of reducing statewide GHG emissions by 15% by the year 2020.

The new CEQA Guidelines will measure whether a project contributes to various state goals, such as reducing greenhouse gas emissions (GHG), developing multimodal transportation, preserving open spaces, and promoting diverse land uses and infill development. Projects that are shown to decrease vehicle miles traveled — for example, bike lanes or pedestrian paths, or a grocery store that allows local residents to travel shorter distances to shop — may be automatically considered to have a "less than significant" impact under CEQA. Under the new CEQA Guidelines, projects may be able to mitigate transportation impacts by funding better transit, creating better access to transit, designing more walkable communities, or implementing other improvements that increase travel choices.

The cities of San Francisco and Pasadena have already modified their local environmental review process by removing automobile delay (i.e., Level of Service) and replacing it with Vehicle Miles Traveled when determining significant traffic impacts on the environment pursuant to CEQA. The statewide revisions to the CEQA Guidelines are expected to be completed in about one year, and the implementation of the revised guidelines may be phased in over the course of two years.

2.5 Funding for Transportation Improvements

Carmel Valley Traffic Impact Improvement Program

The Carmel Valley Traffic Improvement Program (CVTIP) includes a list of projects to relieve congestion and improve traffic operations on Carmel Valley Road. The CVTIP collects fees from new developments to contribute to these improvements. The traffic fees apply to projects within Carmel Valley and to projects in the Greater Carmel Valley Area that will add traffic to Carmel Valley Road. Per the Carmel Valley Traffic Improvement Program EIR, the fee amounts are updated on an annual basis.

TAMC Fee

The Transportation Agency for Monterey County (TAMC) and its member jurisdictions have adopted a county-wide, regional impact fee to cover the costs for studies and construction of many improvements throughout Monterey County. This impact fee, which went into effect on August 27, 2008, is applied to all new development within Monterey County. The governing document for the fee is the *Regional Impact Fee Nexus Study Update* (March 26, 2008) prepared by Kimley-Horn Associates, Inc. The *Regional Impact Fee Nexus Study Update* was updated again in 2013.

Monterey County Traffic Impact Fee

The 2010 Monterey County General Plan, which was adopted October 26, 2010, includes the following policies:

Policy C-1.8 Development proposed in cities and adjacent counties shall be carefully reviewed to assess the proposed development's impact on the County's circulation system. The County, in consultation with TAMC and Monterey County cities shall, within 18 months of adoption of the General Plan, develop a County Traffic Impact fee that addresses Tier 2 impacts of development in cities and unincorporated areas. From the time of adoption of the General Plan until the time of adoption of a County Traffic Impact Fee, the County shall impose an ad hoc fee on its applicants based upon a fair share traffic impact fee study.

Policy C-1.9 All available public and private sources shall be used for the funding of road and highway development, improvement and maintenance.

Policy C-1.10 The County, in coordination with TAMC and other affected agencies, shall continue efforts to improve traffic congestion at critical locations.

Policy C-1.11 In addition to the County Traffic Impact Fee established in Policy C-1.8, the County shall require new development to pay a Regional Traffic Impact Fee developed collaboratively between TAMC, the County, and other local and state agencies to ensure a funding mechanism for regional transportation improvements mitigating Traffic Tier 3 impacts.

3 Existing Traffic Conditions

This section describes the existing street network relevant to the Proposed Project and the existing operational traffic conditions.

3.1 Existing Roadway Network

The key roadways in the vicinity of the Proposed Project are described below:

State Route 1 (SR 1) provides regional access to the project site. SR 1 is a major north-south roadway that connects the Monterey Peninsula with San Luis Obispo County to the south, and with Santa Cruz County and the San Francisco Bay Area to the north. SR 1 is a four-lane freeway north of Carpenter Street, a four- to five-lane (the five-lane section has a two-way center left-turn lane) roadway between Carpenter Street and Ocean Avenue, a three-lane roadway (two lanes northbound and one lane southbound) between Ocean Avenue and Carmel Valley Road, and a two-lane roadway south of Carmel Valley Road. SR 1 is part of the Monterey County Congestion Management Program (CMP) highway network and is designated as a State Scenic Highway. The speed limit on SR 1 in the vicinity of the project is 45 miles per hour.

Local access to the site is provided by Carmel Valley Road, Rio Road, Carmel Rancho Boulevard and Val Verde Drive. These roadways are described below.

Carmel Valley Road is an east-west roadway that begins at SR 1 and continues east to the City of Greenfield. Carmel Valley Road has four lanes from SR 1 to approximately 1,800 feet west of Rancho San Carlos Road. Carmel Valley Road has two lanes east of Rancho San Carlos Road. Carmel Valley Road is classified as a major arterial. The speed limit on Carmel Valley Road in the vicinity of the project is 45 miles per hour.

Rio Road includes two discontinuous segments of roadway east and west of the project site. The eastern part is a short north-south two-lane segment that connects to Carmel Valley Road and provides access to Rancho Canada Golf Club and the Community Church of the Monterey Peninsula. The western part is an east-west roadway with two lanes between SR 1 and Junipero Street, and four lanes between SR 1 and Val Verde Drive. Rio Road would provide access to the project site via Val Verde Drive. The speed limit on Rio Road in the vicinity of the project is 25 miles per hour.

Carmel Rancho Boulevard is a four-lane north-south roadway that extends from Carmel Valley Road to Rio Road. It provides access to various commercial developments and also serves through traffic between Carmel Valley Road and SR 1 south of Rio Road. The speed limit on Carmel Rancho Boulevard in the vicinity of the project is 35 miles per hour.

Val Verde Drive is a two-lane unimproved road that runs north-south for approximately one-quarter mile north of the western portion of Rio Road. Val Verde Drive provides access to several single-family homes and will provide direct access to the project site. There is no posted speed limit on Val Verde Drive.

3.2 Existing Bicycle, Pedestrian and Transit Facilities

The County of Monterey adopted the Monterey County Bikeway Plan in 2008 and the Transportation Agency for Monterey County (TAMC) adopted their Bicycle and Pedestrian Master Plan in 2011. These documents designate routes along roadways that can be used by bicycling commuters and recreational riders for safe access to major employers, shopping centers and schools. Consistent with State and Federal designations,

there are three basic types of bicycle facilities. Each type is described below:

1. Bike path (Class I) - A completely separate right-of-way designed for the exclusive use of cyclists and pedestrians, with minimal crossings for motorists.
2. Bike lane (Class II) - A lane on a regular roadway, separated from the motorized vehicle right-of-way by paint striping, designated for the exclusive or semi-exclusive use of bicycles. Bike lanes allow one-way bike travel. Through travel by motor vehicles or pedestrians is prohibited, but crossing by pedestrians and motorists is permitted.
3. Bike route (Class III) - Provides shared use of the roadway with motorists, designated by signs or permanent markings.

In the vicinity of the Proposed Project, Class II bike lanes are provided on the north side of Carmel Valley Road east of Carmel Rancho Boulevard, and on the south side Carmel Valley Road east of Carmel Middle School.

Sidewalks in the vicinity of the project site are provided on portions of Rio Road between Val Verde Drive and SR 1 and a Class I multi-use path is provided on the east side of SR 1 beginning at the Crossroads Shopping Center and continuing north to Canyon Drive.

The primary public transit service in the County of Monterey is the bus service provided by Monterey-Salinas Transit (MST). In the vicinity of the project site, MST Route 24 provides bus service along Rio Road, Carmel Rancho Boulevard and Carmel Valley Road between Carmel Valley Village and the Monterey Transit Plaza with 60-minute headways during weekday peak hours. MST Route 94 provides bus service along Rio Road and Carmel Rancho Boulevard to and from Carmel-by-the-Sea with about 30 minute headways during weekday mornings between about 7:00 and 9:00 a.m. Bus stops within the study area are located on Carmel Rancho Boulevard north and south of Clock Tower Lane and on Rio Road between Carmel Center Place and Via Nona Marie.

3.3 Existing Intersection Operations

New weekday AM and PM peak hour turning movement counts were conducted at all 9 study intersections in July and August, 2015. A review of the new traffic volumes showed that the new volumes were lower than previously published volumes from other traffic studies at a majority of the study intersections. As a result, adjustments were made to proportionally increase the volumes per the previous (higher) volumes. The adjusted volumes were then balanced where appropriate between study intersections, with consideration given to driveways and intersections between study intersections. The new raw counts and a comparison of the new raw counts, the previously published volumes, and the adjusted and balanced volumes are shown in **Appendix D**.

The Existing conditions peak hour traffic volumes used in the analysis are presented in **Exhibit 4**. Intersection levels of service are summarized in **Exhibit 5**. LOS calculation worksheets are included as **Appendix E**.

Based on the aforementioned level of service standards, the following study intersections operate at unacceptable levels of service under Existing conditions:

- Intersection #3 – SR 1 / Rio Road (LOS D – PM)

- Intersection #7 – SR 1 / Ocean Avenue (LOS D – AM & PM)
- Intersection #8 – SR 1 / Carpenter Street (LOS D – PM)

3.4 Existing Road Segment Operations

Existing peak hour segment volumes for study segments #5 and #11 – #15 were derived from the peak hour intersection volumes described in Section 2.3. In order to be consistent with the Monterey County monitoring program for Carmel Valley Road, existing peak hour segment volumes and ADT's on Carmel Valley Road (segments #6 – #10) were obtained from Monterey County Department of Public Works staff.

Road segment levels of service are summarized in **Exhibits 6** and **7**. LOS calculation worksheets for road segments #5 and #11 - #15 are included as **Appendix F**. Existing peak hour levels of service for study segments #1 - #4 are referenced from the *Rancho Cañada Draft Transportation Impact Study* prepared by CCTC (January 2016).

Under Existing conditions, the ADT's on the Carmel Valley Road study segments (#6 – #10) are below the CVMP ADT thresholds.

Based on the aforementioned level of service standards, the following study road segments operate at unacceptable levels of service under Existing conditions:

- Segment #1 – SR 1 between Carpenter Street and Ocean Avenue
- Segment #3 – SR 1 between Carmel Valley Road and Rio Road
- Segment #6 – Carmel Valley Road between Robinson Canyon Rd and Schulte Rd
- Segment #7 – Carmel Valley Road between Schulte Rd and Rancho San Carlos Road
- Segment #11 – Carmel Rancho Blvd between Carmel Valley Rd and Shopping Ctr Dwy
- Segment #13 – Rio Road between SR 1 and Crossroads Blvd
- Segment #14 – Rio Road between Crossroads Blvd and Carmel Center Place

4 Proposed Project Trip Generation, Distribution and Assignment

The procedures for generating and assigning project trips to the local road network are described in this section.

4.1 Proposed Project Trip Generation

The Proposed Project consists of 24 market rate single family homes and 7 inclusionary units (condos or apartments). Trip generation rates for condos and apartments are lower than for single family homes; however, due to the location of the Proposed Project (i.e., with limited access to regional public transportation), the trip generation rates for single family detached housing was used for all 31 units. This represents a conservative analysis. A trip generation credit was given for the one existing single family house located on the project site.

Trip generation rates published by the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 9th Edition (2012) were used to estimate the trips that will be generated by the Proposed Project using the ITE land use code for single-family detached housing (210). The Proposed Project trip generation estimate is presented in **Exhibit 8**.

The Proposed Project is estimated to generate 285 daily trips, with 22 trips occurring during the AM peak hour (6 in, 16 out) and 30 trips occurring during the PM peak hour (19 in, 11 out).

4.2 Proposed Project Trip Distribution

The Proposed Project trip distribution is based on existing traffic patterns, land uses in the study area and engineering judgment. The Proposed Project trip distribution percentages are shown graphically in **Exhibit 9**.

4.3 Proposed Project Trip Assignment

The trips generated by the Proposed Project were assigned to the road network using the trip distribution percentages shown in **Exhibit 9**. The Proposed Project trip assignment is shown in **Exhibit 10**.

5 Existing Plus Proposed Project Traffic Conditions

This section describes Existing Plus Proposed Project conditions. Traffic related impacts associated with project development are discussed in this section.

5.1 Existing Plus Proposed Project Traffic Volumes

The Proposed Project traffic assignments were added to the existing traffic volumes to obtain Existing Plus Proposed Project traffic volumes. Existing Plus Proposed Project traffic volumes for the AM and PM peak hours are presented in **Exhibit 11**.

5.2 Existing Plus Proposed Project Intersection Operations

Intersection levels of service are summarized in **Exhibit 5**. LOS calculation worksheets are included as **Appendix E**. Based on the aforementioned level of service standards, the following intersections are projected to operate at unacceptable levels of service under Existing Plus Proposed Project conditions:

- Intersection #3 – SR 1 / Rio Road (LOS D – PM)
- Intersection #7 – SR 1 / Ocean Avenue (LOS D – AM & PM)
- Intersection #8 – SR 1 / Carpenter Street (LOS D – PM)

Int. #3 SR 1 / Rio Road
This intersection is under Caltrans jurisdiction. The Proposed Project would add traffic to this intersection, which operates at an unacceptable LOS D during the PM peak hour.

Impacts and Mitigations: The Proposed Project would increase the delay at this intersection, which already operates at a deficient LOS D during the PM peak hour. Based on the Caltrans impact criteria, the Proposed Project would have an impact at this intersection during the PM peak hour.

The TAMC Regional Transportation Plan (RTP) includes a list of projects to improve traffic operations within the project study area. Planned improvements at the SR 1 / Rio Road intersection include:

a. Convert the northbound right-turn lane to a shared through/right-turn lane
b. Add a second westbound right-turn lane
c. Add an exclusive southbound right-turn lane

The Proposed Project's impact would be eliminated with these improvements. The construction of these improvements is dependent on State Transportation Improvement Program (STIP) funding, which is not guaranteed at this time. However, participation in funding these improvements could potentially eliminate the Proposed Project's impacts.

Int. #7 SR 1 / Ocean Avenue
This intersection is under Caltrans jurisdiction. The Proposed Project would add traffic to this intersection, which operates at an unacceptable LOS D during the AM and PM peak hours.

Impacts and Mitigations: The Proposed Project would increase the delay at this intersection, which already operates at a deficient LOS D during the AM and PM peak hours. Based on the Caltrans impact criteria, the

Proposed Project would have an impact at this intersection during the AM and PM peak hours. There are no known planned or feasible improvements at this intersection.

Int. #8 SR 1 / Carpenter Street

This intersection is under Caltrans jurisdiction. The Proposed Project would add traffic to this intersection, which operates at an unacceptable LOS D during the PM peak hour.

Impacts and Mitigations: The Proposed Project would increase the delay at this intersection, which already operates at a deficient LOS D during the PM peak hour. Based on the Caltrans impact criteria, the Proposed Project would have an impact at this intersection during the PM peak hour.

There are no known planned improvements at this intersection. The addition of a dedicated northbound right-turn lane would still result in LOS D operations during the PM peak hour; however, it would eliminate the Proposed Project's impacts by reducing the delay to pre-project conditions.

This improvement is not included in the TAMC Regional Transportation Plan (RTP) list of projects. Operations at this intersection are projected to degrade to LOS E under cumulative traffic conditions, with or without the Proposed Project. A possible improvement at this location for cumulative conditions could be the addition of a third northbound through lane that could be extended north through the intersection before merging back to two northbound SR 1 lanes. This would allow the addition of a third eastbound left-turn lane and would result in acceptable LOS C operations during the AM and PM peak hours under Cumulative Plus Proposed Project traffic conditions.

It is recommended that a dedicated northbound right-turn lane be implemented at this intersection prior to or in conjunction with the Proposed Project. This right-turn lane could then be converted to a northbound shared through/right-turn lane if a third northbound lane is implemented under cumulative conditions.

5.3 Existing Plus Proposed Project Road Segment Operations

Road segment levels of service are summarized in **Exhibits 6** and **7**. LOS calculation worksheets for road segments #5 and #11 - #15 are included as **Appendix F**. Levels of service for study segments #1 - #4 are referenced from the *Rancho Cañada Draft Transportation Impact Study* prepared by CCTC (January 2016). The levels of service for study segments #1 - #4 are reported to remain the same under Existing and Existing Plus 130-Unit Alternative conditions in the Rancho Cañada report. Since the Val Verde Subdivision project includes fewer units (i.e., 31 vs 130 units), the Rancho Cañada report represents a conservative analysis for study segments #1 - #4 for this report.

Under Existing Plus Proposed Project conditions, the ADT's on the Carmel Valley Road study segments (#6 – #10) are projected to be below the CVMP ADT thresholds.

Based on the aforementioned level of service standards, the following road segments are projected to operate at unacceptable levels of service under Existing Plus Proposed Project conditions:

- Segment #1 – SR 1 between Carpenter Street and Ocean Avenue
- Segment #3 – SR 1 between Carmel Valley Road and Rio Road
- Segment #6 – Carmel Valley Road between Robinson Canyon Rd and Schulte Rd
- Segment #7 – Carmel Valley Road between Schulte Rd and Rancho San Carlos Road

- Segment #11 – Carmel Rancho Blvd between Carmel Valley Rd and Shopping Ctr Dwy
- Segment #13 – Rio Road between SR 1 and Crossroads Blvd
- Segment #14 – Rio Road between Crossroads Blvd and Carmel Center Place

Seg. #1 SR 1 between Carpenter Street and Ocean Avenue
This road segment is under Caltrans jurisdiction. The Proposed Project would add traffic to this segment, which operates at an unacceptable LOS D in the southbound direction during the AM peak hour and LOS D in the northbound direction during the PM peak hour.

Impacts and Mitigations: The Proposed Project would add traffic to this road segment, which already operates at a deficient LOS D during the AM and PM peak hours. Based on the Caltrans impact criteria, the Proposed Project would have an impact on this road segment.

There are no known planned improvements on this road segment. However, the addition of a dedicated northbound right-turn lane at the SR 1 / Carpenter Street intersection would improve operations in the northbound direction during the PM peak hour.

It is recommended that a dedicated northbound right-turn lane be implemented at the SR 1 / Carpenter Street intersection prior to or in conjunction with the Proposed Project.

There are no known planned or feasible improvements for this road segment in the southbound direction. As a result, the Proposed Project's would have an impact in the southbound direction.

Seg. #3 SR 1 between Carmel Valley Road and Rio Road
This road segment is under Caltrans jurisdiction. The Proposed Project would add traffic to this segment, which operates at an unacceptable LOS F in the northbound direction during the AM and PM peak hours and LOS E in the southbound direction during the PM peak hour.

Impacts and Mitigations: The Proposed Project would add traffic to this road segment, which already operates at a deficient LOS E and LOS F during the AM and PM peak hours. Based on the Caltrans impact criteria, the Proposed Project would have an impact on this road segment.

The TAMC Regional Transportation Plan (RTP) includes a list of projects to improve traffic operations within the project study area. These improvements include:

1. *Add a second northbound through lane on SR 1 between Rio Road and Carmel Valley Road*

2. *SR 1 / Rio Road Intersection:*
    a. *Convert the northbound right-turn lane to a shared through/right-turn lane*
    b. *Add a second westbound right-turn lane*
    c. *Add an exclusive southbound right-turn lane*

3. *SR 1 / Carmel Valley Road Intersection:*
    a. *Convert the northbound right-turn lane to a shared through/right-turn lane*

The Proposed Project's impacts to Segment #3 in the northbound direction would be eliminated with these improvements. However, the construction of these improvements is dependent on State Transportation

Improvement Program (STIP) funding, which is not guaranteed at this time. Participation in funding these improvements could potentially mitigate the Proposed Project's impacts in the northbound direction. Widening SR 1 would eliminate the project's impacts in the southbound direction; however, this is not considered feasible.

Seg. #6 Carmel Valley Road between Robinson Canyon Road and Schulte Road
This road segment is under the Carmel Valley Master Plan's jurisdiction. The Proposed Project would add traffic to this segment, which operates at an unacceptable LOS E during the AM and PM peak hours. This segment is not projected to exceed the Carmel Valley Master Plan (CVMP) ADT threshold under Existing Plus Proposed Project conditions.

Impacts and Mitigations: The Proposed Project would add trips to a road segment already operating at a deficient LOS E during the AM and PM peak hours. Based on the Carmel Valley Master Plan impact criteria, the Proposed Project would not have an impact on this road segment because it would not worsen the LOS by one letter grade.

Seg. #7 Carmel Valley Road between Schulte Road and Rancho San Carlos Road
This road segment is under the Carmel Valley Master Plan's jurisdiction. The Proposed Project would add traffic to this segment, which operates at an unacceptable LOS E during the AM and PM peak hours. This segment is not projected to exceed the Carmel Valley Master Plan (CVMP) ADT threshold under Existing Plus Proposed Project conditions.

Impacts and Mitigations: The Proposed Project would add trips to a road segment already operating at a deficient LOS E during the AM and PM peak hours. Based on the Carmel Valley Master Plan impact criteria, the Proposed Project would not have an impact on this road segment because it would not worsen the LOS by one letter grade to LOS F.

Seg. #11 Carmel Rancho Boulevard between Carmel Valley Road and Shopping Center Driveway
This road segment is under the Carmel Valley Master Plan's jurisdiction. The Proposed Project would add traffic to this segment, which operates at an unacceptable LOS D and LOS E during the AM and PM peak hours. This segment is not projected to exceed the Carmel Valley Master Plan (CVMP) ADT threshold under Existing Plus Proposed Project conditions.

Impacts and Mitigations: The Proposed Project would add trips to a road segment already operating at a deficient LOS D and LOS E during the AM and PM peak hours. Based on the Carmel Valley Master Plan impact criteria, the Proposed Project would not have an impact on this road segment because it would not worsen the LOS by one letter grade.

Seg. #13 Rio Road between SR 1 and Crossroads Boulevard
This road segment is under the Carmel Valley Master Plan's jurisdiction. The Proposed Project would add traffic to this segment, which operates at an unacceptable LOS D and LOS E during the AM and PM peak hours. This segment is not projected to exceed the Carmel Valley Master Plan (CVMP) ADT threshold under Existing Plus Proposed Project conditions.

Impacts and Mitigations: The Proposed Project would add trips to a road segment already operating at a deficient LOS D and LOS E during the AM and PM peak hours. Based on the Carmel Valley Master Plan impact

criteria, the Proposed Project would not have an impact on this road segment because it would not worsen the LOS by one letter grade.

Seg. #14 Rio Road between Crossroads Boulevard and Carmel Center Place
This road segment is under the Carmel Valley Master Plan's jurisdiction. The Proposed Project would add traffic to this segment, which operates at an unacceptable LOS D and LOS E during the AM and PM peak hours. This segment is not projected to exceed the Carmel Valley Master Plan (CVMP) ADT threshold under Existing Plus Proposed Project conditions.

Impacts and Mitigations: The Proposed Project would add trips to a road segment already operating at a deficient LOS D and LOS E during the AM and PM peak hours. Based on the Carmel Valley Master Plan impact criteria, the Proposed Project would not have an impact on this road segment because it would not worsen the LOS by one letter grade.

5.4 Project Relationship to SB 743

On September 27, 2013, Governor Brown signed Senate Bill (SB) 743 (Steinberg, 2013), which creates a process to change the way that transportation impacts are analyzed under CEQA. SB 743 supports AB 32, the California Global Warming Solutions Act of 2006, and SB 375, the Sustainable Communities and Climate Protection Act of 2008, which call for substantial reductions in greenhouse gas (GHG) emissions. SB 743 mandates a change in the way that public agencies evaluate transportation impacts of projects under CEQA. Under the new CEQA Guidelines, aspects of project location and design that influence travel choices, and thereby improve or degrade air quality, safety, and health, must be considered. The new CEQA Guidelines will eliminate the use of automobile delay, including Level of Service (LOS), in evaluating transportation impacts and replace it with Vehicle Miles Traveled (VMT), based on a goal of reducing statewide GHG emissions by 15% by the year 2020.

The new CEQA Guidelines will measure whether a project contributes to various state goals, such as reducing greenhouse gas emissions (GHG), developing multimodal transportation, preserving open spaces, and promoting diverse land uses and infill development. Projects that are shown to decrease vehicle miles traveled — for example, bike lanes or pedestrian paths, or a grocery store that allows local residents to travel shorter distances to shop — may be automatically considered to have a "less than significant" impact under CEQA. Under the new CEQA Guidelines, projects may be able to mitigate transportation impacts by funding better transit, creating better access to transit, designing more walkable communities, or implementing other improvements that increase travel choices.

The cities of San Francisco and Pasadena have already modified their local environmental review process by removing automobile delay (i.e., Level of Service) and replacing it with Vehicle Miles Traveled when determining significant traffic impacts on the environment pursuant to CEQA. The statewide revisions to the CEQA Guidelines are expected to be completed in about one year, and the implementation of the revised guidelines may be phased in over the course of two years.

A VMT analysis has not been performed for the Val Verde Subdivision project. However, the project has a unique location that is in close proximity to three major shopping centers (i.e., The Barnyard, Crossroads and Carmel Rancho Shopping Centers) and public transportation. The Proposed Project likely would meet the primary goal of SB 743 by reducing VMT and greenhouse gas emissions.

The project site is located in close proximity to a wide variety of public-serving businesses, including the

following:

- Grocery Stores: 3
- Banks: 5
- Restaurants: 14
- Coffee Shops: 3
- Bakery: 2
- Post Office: 1
- Brokerage Houses: 2
- Gas Stations: 2
- Hair Salons: 3
- Hardware Stores: 2
- Pet Supply and Vet Services: 3
- Clothing & Jewelry Stores: 8
- Various Home Decorator Stores: 6
- Title Companies: 2
- Real Estate Offices: 3
- Doctors and Dentists: 7
- Copy Center: 1
- Book Store: 1
- Liquor Stores: 4
- Law Offices: 3
- Galleries: 3

All of the businesses listed above are within about an 8 to 18-minute walk of the proposed project. In addition, there are four transit stops in the project area, providing access to County-wide public transportation.

6 Background Traffic Conditions

This section of the report describes the analyses of the study road network under Background traffic conditions. Background conditions models traffic conditions with traffic from approved but not yet constructed developments added to the study intersections.

6.1 Background Traffic Volumes

AM and PM peak hour traffic generated by projects approved for development, but not yet constructed or occupied, was estimated based on trip generation rates within the Institute of Transportation Engineers' *Trip Generation* handbook, 9th Edition, 2012. The list of approved but not yet built projects is provided in **Appendix G** with a trip generation estimate for each project. The location of each approved but not yet built project is provided in **Appendix H**. Most of the projects listed in **Appendix G** were approved within the last 4 years but none of them have commenced with active construction to date.

It should be noted that trips generated by the Carmel Canine Sports Center project are included in the Background conditions analysis as the project was considered to be approved at the time of the analysis. The project was subsequently denied and has been removed from the list of approved projects. It was determined that removing the trips generated by the Carmel Canine Sports Center project from the analysis would not change the conclusions of this report. As a result, these trips remain in the level of service calculations and the results of the analysis can be considered conservative.

The trips generated by the approved but not yet built or occupied projects were assigned to the road network and combined with the existing peak hour volumes to obtain Background traffic volumes. The Background peak hour volumes are shown in **Exhibit 12**.

6.2 Background Intersection Operations

Intersection levels of service are summarized in **Exhibit 5**. LOS calculation worksheets are included as **Appendix E**.

Based on the aforementioned level of service standards, the following study intersections are projected to operate at unacceptable levels of service under Background conditions:

- Intersection #3 – SR 1 / Rio Road (LOS D – PM)
- Intersection #7 – SR 1 / Ocean Avenue (LOS D – AM & PM)
- Intersection #8 – SR 1 / Carpenter Street (LOS D – PM)

6.3 Background Road Segment Operations

Road segment levels of service are summarized in **Exhibits 6** and **7**. LOS calculation worksheets for road segments #5 and #11 - #15 are included as **Appendix F**. Levels of service for study segments #1 - #4 are referenced from the worst-case levels of service reported in the *Rancho Cañada Draft Transportation Impact Study* prepared by CCTC (January 2016).

Under Background conditions, the ADT's on Carmel Valley Road study segments #6 and #7 are projected to exceed the CVMP ADT thresholds.

Based on the aforementioned level of service standards, the following road segments are projected to operate at unacceptable levels of service under Background conditions:

- Segment #1 – SR 1 between Carpenter Street and Ocean Avenue
- Segment #2 – SR 1 between Ocean Avenue and Carmel Valley Road
- Segment #3 – SR 1 between Carmel Valley Road and Rio Road
- Segment #6 – Carmel Valley Road between Robinson Canyon Rd and Schulte Rd
- Segment #7 – Carmel Valley Road between Schulte Rd and Rancho San Carlos Road
- Segment #11 – Carmel Rancho Blvd between Carmel Valley Rd and Shopping Ctr Dwy
- Segment #13 – Rio Road between SR 1 and Crossroads Blvd
- Segment #14 – Rio Road between Crossroads Blvd and Carmel Center Place

7 Background Plus Proposed Project Traffic Conditions

This section of the report describes the analyses of the study road network under the Background Plus Proposed Project traffic conditions. Background Plus Proposed Project conditions includes traffic from approved but not yet constructed developments and traffic generated by the Proposed Project added to the study intersections.

7.1 Background Plus Proposed Project Traffic Volumes

The trips generated by the Proposed Project were assigned to the road network and combined with the background peak hour volumes to obtain Background Plus Proposed Project conditions traffic volumes. Background Plus Proposed Project AM and PM peak hour traffic volumes are shown in **Exhibit 13**.

7.2 Background Plus Proposed Project Intersection Operations

Intersection levels of service are summarized in **Exhibit 5**. LOS calculation worksheets are included as **Appendix E**.

Based on the aforementioned level of service standards, the following study intersections are projected to operate at unacceptable levels of service under Background Plus Proposed Project conditions:

- Intersection #3 – SR 1 / Rio Road (LOS D – PM)
- Intersection #7 – SR 1 / Ocean Avenue (LOS D – AM & PM)
- Intersection #8 – SR 1 / Carpenter Street (LOS D – PM)

Int. #3 SR 1 / Rio Road
This intersection is under Caltrans jurisdiction. The Proposed Project would add traffic to this intersection, which is projected to operate at an unacceptable LOS D during the PM peak hour.

Impacts and Mitigations: The Proposed Project would increase the delay at this intersection, which is projected to operate at a deficient LOS D during the PM peak hour. Based on the Caltrans impact criteria, the Proposed Project would have an impact at this intersection during the PM peak hour.

The TAMC Regional Transportation Plan (RTP) includes a list of projects to improve traffic operations within the project study area. Planned improvements at the SR 1 / Rio Road intersection include:

a. *Convert the northbound right-turn lane to a shared through/right-turn lane*
b. *Add a second westbound right-turn lane*
c. *Add an exclusive southbound right-turn lane*

The Proposed Project's impact would be eliminated with these improvements. However, the construction of these improvements is dependent on State Transportation Improvement Program (STIP) funding, which is not guaranteed at this time. Participation in funding these improvements could potentially mitigate the Proposed Project's impacts.

Int. #7 SR 1 / Ocean Avenue
This intersection is under Caltrans jurisdiction. The Proposed Project would add traffic to this intersection, which is projected to operate at an unacceptable LOS D during the AM and PM peak hours.

Impacts and Mitigations: The Proposed Project would increase the delay at this intersection, which is projected to operate at a deficient LOS D during the AM and PM peak hours. Based on the Caltrans impact criteria, the Proposed Project would have an impact at this intersection during the AM and PM peak hours. There are no known planned or feasible improvements at this intersection.

Int. #8 SR 1 / Carpenter Street

This intersection is under Caltrans jurisdiction. The Proposed Project would add traffic to this intersection, which is projected to operate at an unacceptable LOS D during the PM peak hour.

Impacts and Mitigations: The Proposed Project would increase the delay at this intersection, which is projected to operate at a deficient LOS D during the PM peak hour. Based on the Caltrans impact criteria, the Proposed Project would have an impact at this intersection during the PM peak hour. There are no known planned improvements at this intersection. The addition of a dedicated northbound right-turn lane would still result in LOS D operations during the PM peak hour; however, it would eliminate the Proposed Project's impacts by reducing the delay to pre-project conditions.

This improvement is not included in the TAMC Regional Transportation Plan (RTP) list of projects. Operations at this intersection are projected to degrade to LOS E under cumulative traffic conditions, with or without the Proposed Project. A possible improvement at this location for cumulative conditions could be the addition of a third northbound through lane that could be extended north through the intersection before merging back to two northbound SR 1 lanes. This would allow the addition of a third eastbound left-turn lane and would result in acceptable LOS C operations during the AM and PM peak hours under Cumulative Plus Project traffic conditions.

It is recommended that a dedicated northbound right-turn lane be implemented at this intersection prior to or in conjunction with the Proposed Project. This right-turn lane could then be converted to a northbound shared through/right-turn lane if a third northbound lane is implemented under cumulative conditions.

7.3 Background Plus Proposed Project Road Segment Operations

Road segment levels of service are summarized in **Exhibits 6** and **7**. LOS calculation worksheets for road segments #5 and #11 - #15 are included as **Appendix F**. Levels of service for study segments #1 - #4 are referenced from the worst-case levels of service reported in the *Rancho Cañada Draft Transportation Impact Study* prepared by CCTC (January 2016).

Based on the aforementioned level of service standards, the following study road segments are projected to operate at unacceptable levels of service under Background Plus Proposed Project conditions:

- Segment #1 – SR 1 between Carpenter Street and Ocean Avenue
- Segment #2 – SR 1 between Ocean Avenue and Carmel Valley Road
- Segment #3 – SR 1 between Carmel Valley Road and Rio Road
- Segment #6 – Carmel Valley Road between Robinson Canyon Rd and Schulte Rd
- Segment #7 – Carmel Valley Road between Schulte Rd and Rancho San Carlos Road
- Segment #11 – Carmel Rancho Blvd between Carmel Valley Rd and Shopping Ctr Dwy
- Segment #13 – Rio Road between SR 1 and Crossroads Blvd
- Segment #14 – Rio Road between Crossroads Blvd and Carmel Center Place

Seg. #1 SR 1 between Carpenter Street and Ocean Avenue
This road segment is under Caltrans jurisdiction. The Proposed Project would add traffic to this segment, which is projected to operate at an unacceptable LOS D in the northbound direction during the PM peak hour and LOS D in the southbound direction during the AM peak hour.

Impacts and Mitigations: The Proposed Project would add traffic to this road segment, which is projected to operate at a deficient LOS D during the AM and PM peak hours. Based on the Caltrans impact criteria, the Proposed Project would have an impact on this road segment.

There are no known planned improvements on this road segment. However, the addition of a dedicated northbound right-turn lane at the SR 1 / Carpenter Street intersection would improve operations in the northbound direction during the PM peak hour.

It is recommended that a dedicated northbound right-turn lane be implemented at the SR 1 / Carpenter Street intersection prior to or in conjunction with the Proposed Project.

There are no known planned or feasible improvements for this road segment in the southbound direction. As a result, the Proposed Project's would have an impact in the southbound direction.

Seg. #2 SR 1 between Ocean Avenue and Carmel Valley Road
This road segment is under Caltrans jurisdiction. The Proposed Project would add traffic to this segment, which is projected to operate at an unacceptable LOS F in the northbound direction during the AM peak hour.

Impacts and Mitigations: The Proposed Project would add traffic to this road segment, which is projected to operate at a deficient LOS F during the AM peak hour. Based on the Caltrans impact criteria, the Proposed Project would have an impact on this road segment. There are no known planned or feasible improvements for this road segment.

Seg. #3 SR 1 between Carmel Valley Road and Rio Road
This road segment is under Caltrans jurisdiction. The Proposed Project would add traffic to this segment, which is projected to operate at an unacceptable LOS F in the northbound direction during the AM and PM peak hours and LOS E in the southbound direction during the PM peak hour.

Impacts and Mitigations: The Proposed Project would add traffic to this road segment, which is projected to operate at a deficient LOS E and LOS F during the AM and PM peak hours. Based on the Caltrans impact criteria, the Proposed Project would have an impact on this road segment.

The TAMC Regional Transportation Plan (RTP) includes a list of projects to improve traffic operations within the project study area. These improvements include:

1. *Add a second northbound through lane on SR 1 between Rio Road and Carmel Valley Road*

2. *SR 1 / Rio Road Intersection:*
    a. *Convert the northbound right-turn lane to a shared through/right-turn lane*
    b. *Add a second westbound right-turn lane*
    c. *Add an exclusive southbound right-turn lane*

3. *SR 1 / Carmel Valley Road Intersection:*
    a. *Convert the northbound right-turn lane to a shared through/right-turn lane*

The Proposed Project's impacts to Segment #3 in the northbound direction would be eliminated with these improvements. However, the construction of these improvements is dependent on State Transportation Improvement Program (STIP) funding, which is not guaranteed at this time. Participation in funding these improvements could potentially mitigate the Proposed Project's impacts.

Seg. #6 Carmel Valley Road between Robinson Canyon Road and Schulte Road
This road segment is under the Carmel Valley Master Plan's jurisdiction. The Proposed Project would add traffic to this segment, which is projected to operate at an unacceptable LOS E during the AM and PM peak hours. This segment is also projected to exceed the Carmel Valley Master Plan (CVMP) ADT threshold under Background Plus Proposed Project conditions.

Impacts and Mitigations: The Proposed Project would add trips to a road segment already operating at a deficient LOS E during the AM and PM peak hours and a segment that exceeds the CVMP ADT threshold. Based on the Carmel Valley Master Plan impact criteria, the Proposed Project would have an impact on this road segment because it would exceed the CVMP ADT threshold.

The impacts to segment #6 would be eliminated by widening Carmel Valley Road at this location to four lanes; however, this is not considered feasible.

Seg. #7 Carmel Valley Road between Schulte Road and Rancho San Carlos Road
This road segment is under the Carmel Valley Master Plan's jurisdiction. The Proposed Project would add traffic to this segment, which is projected to operate at an unacceptable LOS E during the AM and PM peak hours. This segment is also projected to exceed the Carmel Valley Master Plan (CVMP) ADT threshold under Background Plus Proposed Project conditions.

Impacts and Mitigations: The Proposed Project would add trips to a road segment already operating at a deficient LOS E during the AM and PM peak hours and a segment that exceeds the CVMP ADT threshold. Based on the Carmel Valley Master Plan impact criteria, the Proposed Project would have an impact on this road segment because it would exceed the CVMP ADT threshold.

The impacts to segment #7 would be eliminated by widening Carmel Valley Road at this location to four lanes; however, this is not considered feasible.

Seg. #11 Carmel Rancho Boulevard between Carmel Valley Road and Shopping Center Driveway
This road segment is under the Carmel Valley Master Plan's jurisdiction. The Proposed Project would add traffic to this segment, which is projected to operate at an unacceptable LOS D and LOS E during the AM and PM peak hours. This segment is not projected to exceed the Carmel Valley Master Plan (CVMP) ADT threshold under Background Plus Proposed Project conditions.

Impacts and Mitigations: The Proposed Project would add trips to a road segment already operating at a deficient LOS D and LOS E during the AM and PM peak hours. Based on the Carmel Valley Master Plan impact criteria, the Proposed Project would not have an impact on this road segment because it would not worsen the LOS by one letter grade.

Seg. #13 Rio Road between SR 1 and Crossroads Boulevard
This road segment is under the Carmel Valley Master Plan's jurisdiction. The Proposed Project would add traffic to this segment, which is projected to operate at an unacceptable LOS D and LOS E during the AM and PM peak hours. This segment is not projected to exceed the Carmel Valley Master Plan (CVMP) ADT threshold under Background Plus Proposed Project conditions.

Impacts and Mitigations: The Proposed Project would add trips to a road segment already operating at a deficient LOS D and LOS E during the AM and PM peak hours. Based on the Carmel Valley Master Plan impact criteria, the Proposed Project would not have an impact on this road segment because it would not worsen the LOS by one letter grade.

Seg. #14 Rio Road between Crossroads Boulevard and Carmel Center Place
This road segment is under the Carmel Valley Master Plan's jurisdiction. The Proposed Project would add traffic to this segment, which is projected to operate at an unacceptable LOS D and LOS E during the AM and PM peak hours. This segment is not projected to exceed the Carmel Valley Master Plan (CVMP) ADT threshold under Background Plus Proposed Project conditions.

Impacts and Mitigations: The Proposed Project would add trips to a road segment already operating at a deficient LOS D and LOS E during the AM and PM peak hours. Based on the Carmel Valley Master Plan impact criteria, the Proposed Project would not have an impact on this road segment because it would not worsen the LOS by one letter grade.

8 Cumulative Traffic Conditions

This section describes the analysis and results for 2035 Cumulative conditions.

8.1 Cumulative Roadway Network

As discussed in Section 1.5 of this report, the Transportation Agency for Monterey County (TAMC) and its member jurisdictions have adopted a county-wide, regional impact fee to cover the costs for studies and the construction of many improvements throughout Monterey County. This impact fee, which went into effect on August 27, 2008, is applied to all new development within Monterey County.

The TAMC Regional Transportation Plan (RTP) includes a list of projects to improve traffic operations within the project study area. These improvements include:

1. Add a second northbound through lane on SR 1 between Rio Road and Carmel Valley Road

2. SR 1 / Rio Road Intersection:
    a. Convert the northbound right-turn lane to a shared through/right-turn lane
    b. Add a second westbound right-turn lane
    c. Add an exclusive southbound right-turn lane

3. SR 1 / Carmel Valley Road Intersection:
    a. Convert the northbound right-turn lane to a shared through/right-turn lane

The construction of these improvements is dependent on State Transportation Improvement Program (STIP) funding, which is not guaranteed at this time. As a result, these improvements are not assumed to be in place under Cumulative traffic conditions. However, participation in funding these improvements has been included as a potential mitigation measure.

8.2 2035 Cumulative Traffic Volume Forecasts

The Cumulative conditions analysis is based upon the 2035 traffic volume forecasts from the 2014 AMBAG Regional Traffic Demand Model (RTDM) as well as a list of pending but not yet approved projects located within Carmel Valley. Traffic increases due to the list of pending projects were given precedence over the RTDM forecasts in the vicinity of the project as they are local in nature, result in higher volume forecasts than the RTDM, and provide a more conservative estimate of future traffic volumes. The RTDM forecasts were used in areas where the addition of traffic from pending projects resulted in lower volumes than the RTDM forecasts, again providing a more conservative analysis.

AM and PM peak hour traffic generated by pending projects was estimated based on trip generation rates within the Institute of Transportation Engineers' *Trip Generation* handbook, 9th Edition, 2012. The list of pending projects is provided in **Appendix I** with a trip generation estimate for each project. The location of each pending project is provided in **Appendix J**. The AMBAG 2014 and 2035 daily traffic model plots for the study area are provided in **Appendix K**. Cumulative conditions AM and PM peak hour traffic volumes are included in **Exhibit 14**.

8.3 Cumulative Intersection Operations

Intersection levels of service are summarized in **Exhibit 5**. LOS calculation worksheets are included as

Appendix E.

Based on the aforementioned level of service standards, the following study intersections are projected to operate at unacceptable levels of service under Cumulative conditions:

- Intersection #1 – SR 1 / Carmel Valley Road (LOS D – PM)
- Intersection #3 – SR 1 / Rio Road (LOS D – PM)
- Intersection #7 – SR 1 / Ocean Avenue (LOS E – AM & PM)
- Intersection #8 – SR 1 / Carpenter Street (LOS E – PM)

8.4 Cumulative Road Segment Operations

Road segment levels of service are summarized in **Exhibits 6** and **7**. LOS calculation worksheets for road segments #5 and #11 - #15 are included as **Appendix F**. Levels of service for study segments #1 - #4 are referenced from the worst-case levels of service reported in the *Rancho Cañada Draft Transportation Impact Study* prepared by CCTC (January 2016).

Under Cumulative conditions, the ADT's on Carmel Valley Road study segments #6 and #7 are projected to exceed the CVMP ADT thresholds.

Based on the aforementioned level of service standards, the following study road segments are projected to operate at unacceptable levels of service under Cumulative conditions:

- Segment #1 – SR 1 between Carpenter Street and Ocean Avenue
- Segment #2 – SR 1 between Ocean Avenue and Carmel Valley Road
- Segment #3 – SR 1 between Carmel Valley Road and Rio Road
- Segment #6 – Carmel Valley Road between Robinson Canyon Rd and Schulte Rd
- Segment #7 – Carmel Valley Road between Schulte Rd and Rancho San Carlos Road
- Segment #11 – Carmel Rancho Blvd between Carmel Valley Rd and Shopping Ctr Dwy
- Segment #13 – Rio Road between SR 1 and Crossroads Blvd
- Segment #14 – Rio Road between Crossroads Blvd and Carmel Center Place

9 Cumulative Plus Proposed Project Traffic Conditions

This section describes the analysis and results for 2035 Cumulative conditions with the Proposed Project.

Trips generated by the Proposed Project were added to the 2035 cumulative volumes to obtain Cumulative Plus Proposed Project traffic volumes. Cumulative Plus Proposed Project traffic volumes are presented in **Exhibit 15**.

9.1 Cumulative Plus Proposed Project Intersection Operations

Intersection levels of service are summarized in **Exhibit 5**. LOS calculation worksheets are included as **Appendix E**.

Based on the aforementioned level of service standards, the following study intersections are projected to operate at unacceptable levels of service under Cumulative Plus Proposed Project conditions:

- Intersection #1 – SR 1 / Carmel Valley Road (LOS D – PM)
- Intersection #3 – SR 1 / Rio Road (LOS D – PM)
- Intersection #7 – SR 1 / Ocean Avenue (LOS E – AM & PM)
- Intersection #8 – SR 1 / Carpenter Street (LOS E – PM)

Int. #1 SR 1 / Carmel Valley Road
This intersection is under Caltrans jurisdiction. The Proposed Project would add traffic to this intersection, which is projected to operate at an unacceptable LOS D during the PM peak hour.

Impacts and Mitigations: The Proposed Project would increase the delay at this intersection, which is projected to operate at a deficient LOS D during the PM peak hour. Based on the Caltrans impact criteria, the Proposed Project would have an impact at this intersection during the PM peak hour.

The TAMC Regional Transportation Plan (RTP) includes a list of projects to improve traffic operations within the project study area. Planned improvements at the SR 1 / Carmel Valley Road intersection include:

a. Convert the northbound right-turn lane to a shared through/right-turn lane

This would result in acceptable LOS B operations and the Proposed Project's impact would be eliminated with these improvements. However, the construction of these improvements is dependent on State Transportation Improvement Program (STIP) funding, which is not guaranteed at this time. Participation in funding these improvements could potentially mitigate the Proposed Project's impacts.

Both TAMC and Caltrans consider payment of regional development impact fees as adequate mitigation for cumulative impacts to state highways and the regional road network. Therefore, payment of the TAMC fee would mitigate the Proposed Project's contribution to cumulative impacts at this location.

Int. #3 SR 1 / Rio Road
This intersection is under Caltrans jurisdiction. The Proposed Project would add traffic to this intersection, which is projected to operate at an unacceptable LOS D during the PM peak hour.

Impacts and Mitigations: The Proposed Project would increase the delay at this intersection, which is projected to operate at a deficient LOS D during the PM peak hour. Based on the Caltrans impact criteria, the Proposed Project would have an impact at this intersection during the PM peak hour.

The TAMC Regional Transportation Plan (RTP) includes a list of projects to improve traffic operations within the project study area. Planned improvements at the SR 1 / Rio Road intersection include:

a. *Convert the northbound right-turn lane to a shared through/right-turn lane*
b. *Add a second westbound right-turn lane*
c. *Add an exclusive southbound right-turn lane*

The Proposed Project's impact would be eliminated with these improvements. However, the construction of these improvements is dependent on State Transportation Improvement Program (STIP) funding, which is not guaranteed at this time. Participation in funding these improvements could potentially mitigate the Proposed Project's impacts.

Both TAMC and Caltrans consider payment of regional development impact fees as adequate mitigation for cumulative impacts to state highways and the regional road network. Therefore, payment of the TAMC fee would mitigate the Proposed Project's contribution to cumulative impacts at this location.

Int. #7 SR 1 / Ocean Avenue

This intersection is under Caltrans jurisdiction. The Proposed Project would add traffic to this intersection, which is projected to operate at an unacceptable LOS E during the AM and PM peak hours.

Impacts and Mitigations: The Proposed Project would increase the delay at this intersection, which is projected to operate at a deficient LOS E during the AM and PM peak hours. Based on the Caltrans impact criteria, the Proposed Project would have an impact at this intersection during the AM and PM peak hours. There are no known planned or feasible improvements at this intersection.

Both TAMC and Caltrans consider payment of regional development impact fees as adequate mitigation for cumulative impacts to state highways and the regional road network. Therefore, payment of the TAMC fee would mitigate the Proposed Project's contribution to cumulative impacts at this location.

Int. #8 SR 1 / Carpenter Street

This intersection is under Caltrans jurisdiction. The Proposed Project would add traffic to this intersection, which is projected to operate at an unacceptable LOS E during the PM peak hour.

Impacts and Mitigations: The Proposed Project would increase the delay at this intersection, which is projected to operate at a deficient LOS E during the PM peak hour. Based on the Caltrans impact criteria, the Proposed Project would have an impact at this intersection during the PM peak hour.

There are no known planned improvements at this intersection. The addition of a dedicated northbound right-turn lane would still result in LOS E operations during the PM peak hour; however, it would reduce the delay to pre-project conditions. This improvement is not included in the TAMC Regional Transportation Plan (RTP) list of projects. A possible improvement at this location for Cumulative conditions could be the addition of a third northbound through lane that could be extended north through the intersection before merging back to two northbound SR 1 lanes. This would allow the addition of a third eastbound left-turn lane and

would result in acceptable LOS C operations during the AM and PM peak hours under Cumulative Plus Proposed Project traffic conditions.

Both TAMC and Caltrans consider payment of regional development impact fees as adequate mitigation for cumulative impacts to state highways and the regional road network. Therefore, payment of the TAMC fee would mitigate the Proposed Project's contribution to cumulative impacts at this location.

9.2 Cumulative Plus Proposed Project Road Segment Operations

Road segment levels of service are summarized in **Exhibits 6** and **7**. LOS calculation worksheets for road segments #5 and #11 - #15 are included as **Appendix F**. Levels of service for study segments #1 - #4 are referenced from the worst-case levels of service reported in the *Rancho Cañada Draft Transportation Impact Study* prepared by CCTC (January 2016).

Based on the aforementioned level of service standards, the following study road segments are projected to operate at unacceptable levels of service under Cumulative Plus Proposed Project conditions:

- Segment #1 – SR 1 between Carpenter Street and Ocean Avenue
- Segment #2 – SR between Ocean Avenue and Carmel Valley Road
- Segment #3 – SR 1 between Carmel Valley Road and Rio Road
- Segment #6 – Carmel Valley Road between Robinson Canyon Rd and Schulte Rd
- Segment #7 – Carmel Valley Road between Schulte Rd and Rancho San Carlos Road
- Segment #11 – Carmel Rancho Blvd between Carmel Valley Rd and Shopping Ctr Dwy
- Segment #13 – Rio Road between SR 1 and Crossroads Blvd
- Segment #14 – Rio Road between Crossroads Blvd and Carmel Center Place

Seg. #1 SR 1 between Carpenter Street and Ocean Avenue

This road segment is under Caltrans jurisdiction. The Proposed Project would add traffic to this segment, which is projected to operate at an unacceptable LOS D in the northbound (PM) southbound (AM) directions.

Impacts and Mitigations: The Proposed Project would add traffic to this road segment, which is projected to operate at a deficient LOS D during the AM and PM peak hours. Based on the Caltrans impact criteria, the Proposed Project would have a cumulative impact on this road segment.

There are no known planned improvements on this road segment. However, the addition of a dedicated northbound right-turn lane at the SR 1 / Carpenter Street intersection would improve operations to pre-project conditions in the northbound direction during the PM peak hour which would eliminate the Proposed Project's impact for the northbound direction.

It is recommended that a dedicated northbound right-turn lane be implemented at the SR 1 / Carpenter Street intersection prior to or in conjunction with the Proposed Project.

There are no known planned or feasible improvements for this road segment in the southbound direction. As a result, the Proposed Project's impacts in the southbound direction would remain a cumulative impact.

Both TAMC and Caltrans consider payment of regional development impact fees as adequate mitigation for

cumulative impacts to state highways and the regional road network. Therefore, payment of the TAMC fee would mitigate the Proposed Project's contribution to cumulative impacts at this location.

Seg. #2 SR 1 between Ocean Avenue and Carmel Valley Road

This road segment is under Caltrans jurisdiction. The Proposed Project would add traffic to this segment, which is projected to operate at an unacceptable LOS F in the northbound direction during the AM peak hour.

Impacts and Mitigations: The Proposed Project would add traffic to this road segment, which is projected to operate at a deficient LOS F during the AM peak hour. Based on the Caltrans impact criteria, the Proposed Project would have a cumulative impact on this road segment.

There are no known planned or feasible improvements for this road segment. As a result, the Proposed Project would have a cumulative impact.

Both TAMC and Caltrans consider payment of regional development impact fees as adequate mitigation for cumulative impacts to state highways and the regional road network. Therefore, payment of the TAMC fee would mitigate the Proposed Project's contribution to cumulative impacts at this location.

Seg. #3 SR 1 between Carmel Valley Road and Rio Road

This road segment is under Caltrans jurisdiction. The Proposed Project would add traffic to this segment, which is projected to operate at an unacceptable LOS F in the northbound direction during the AM and PM Peak hours and LOS E in the southbound direction during the PM peak hour.

Impacts and Mitigations: The Proposed Project would add traffic to this road segment, which is projected to operate at a deficient LOS E and LOS F during the AM and PM peak hours. Based on the Caltrans impact criteria, the Proposed Project would have a cumulative impact on this road segment.

The TAMC Regional Transportation Plan (RTP) includes a list of projects to improve traffic operations within the project study area. These improvements include:

1. *Add a second northbound through lane on SR 1 between Rio Road and Carmel Valley Road*

2. *SR 1 / Rio Road Intersection:*
    a. *Convert the northbound right-turn lane to a shared through/right-turn lane*
    b. *Add a second westbound right-turn lane*
    c. *Add an exclusive southbound right-turn lane*

3. *SR 1 / Carmel Valley Road Intersection:*
    a. *Convert the northbound right-turn lane to a shared through/right-turn lane*

The Proposed Project's impacts to Segment #3 in the northbound direction would be eliminated with these improvements. However, the construction of these improvements is dependent on State Transportation Improvement Program (STIP) funding, which is not guaranteed at this time. However, participation in funding these improvements could potentially mitigate the Proposed Project's impacts.
In addition, both TAMC and Caltrans consider payment of regional development impact fees as adequate mitigation for cumulative impacts to state highways and the regional road network. Therefore, payment of

the TAMC fee would mitigate the Proposed Project's contribution to cumulative impacts at this location.

Seg. #6 Carmel Valley Road between Robinson Canyon Road and Schulte Road
This road segment is under the Carmel Valley Master Plan's jurisdiction. The Proposed Project would add traffic to this segment, which is projected to operate at an unacceptable LOS E during the AM and PM peak hours. This segment is also projected to exceed the Carmel Valley Master Plan (CVMP) ADT threshold under Cumulative Plus Proposed Project conditions.

Impacts and Mitigations: The Proposed Project would add trips to a road segment already operating at a deficient LOS E during the AM and PM peak hours and a segment that exceeds the CVMP ADT threshold. Based on the Carmel Valley Master Plan impact criteria, the Proposed Project would have a cumulative impact on this road segment because it would exceed the CVMP ADT threshold.

The impacts to segment #6 would be eliminated by widening Carmel Valley Road at this location to four lanes; however, this is not considered feasible.

Seg. #7 Carmel Valley Road between Schulte Road and Rancho San Carlos Road
This road segment is under the Carmel Valley Master Plan's jurisdiction. The Proposed Project would add traffic to this segment, which is projected to operate at an unacceptable LOS E during the AM and PM peak hours. This segment is also projected to exceed the Carmel Valley Master Plan (CVMP) ADT threshold under Cumulative Plus Proposed Project conditions.

Impacts and Mitigations: The Proposed Project would add trips to a road segment already operating at a deficient LOS E during the AM and PM peak hours and a segment that exceeds the CVMP ADT threshold. Based on the Carmel Valley Master Plan impact criteria, the Proposed Project would have a cumulative impact on this road segment because it would exceed the CVMP ADT threshold.

The impacts to segment #7 would be eliminated by widening Carmel Valley Road at this location to four lanes; however, this is not considered feasible.

Seg. #11 Carmel Rancho Boulevard between Carmel Valley Road and Shopping Center Driveway
This road segment is under the Carmel Valley Master Plan's jurisdiction. The Proposed Project would add traffic to this segment, which is projected to operate at an unacceptable LOS D and LOS E during the AM and PM peak hours. This segment is not projected to exceed the Carmel Valley Master Plan (CVMP) ADT threshold under Cumulative Plus Proposed Project conditions.

Impacts and Mitigations: The Proposed Project would add trips to a road segment already operating at a deficient LOS D and LOS E during the AM and PM peak hours. Based on the Carmel Valley Master Plan impact criteria, the Proposed Project would not have an impact on this road segment because it would not worsen the LOS by one letter grade.

Seg. #13 Rio Road between SR 1 and Crossroads Boulevard
This road segment is under the Carmel Valley Master Plan's jurisdiction. The Proposed Project would add traffic to this segment, which is projected to operate at an unacceptable LOS D, LOS E and LOS F during the AM and PM peak hours. This segment is not projected to exceed the Carmel Valley Master Plan (CVMP) ADT threshold under Cumulative Plus Proposed Project conditions.

Impacts and Mitigations: The Proposed Project would add trips to a road segment already operating at a deficient LOS D, LOS E and LOS F during the AM and PM peak hours. Based on the Carmel Valley Master Plan impact criteria, the Proposed Project would have a cumulative impact on this road segment because it would add traffic to a road segment operating at LOS D, LOS E and LOS F.

The TAMC Regional Transportation Plan (RTP) includes a list of projects to improve traffic operations within the project study area. Improvements at the SR 1 / Rio Road intersection include:

a. *Convert the northbound right-turn lane to a shared through/right-turn lane*
b. *Add a second westbound right-turn lane*
c. *Add an exclusive southbound right-turn lane*

Based on the Carmel Valley Master Plan impact criteria, the Proposed Project would not have an impact on this road segment in the eastbound direction because it would not worsen the LOS by one letter grade.

The Proposed Project's impacts to this segment in the westbound direction would be eliminated with the aforementioned improvements. However, the construction of these improvements is dependent on State Transportation Improvement Program (STIP) funding, which is not guaranteed at this time. Participation in funding these improvements could potentially mitigate the Proposed Project's impacts.

Seg. #14 Rio Road between Crossroads Boulevard and Carmel Center Place

This road segment is under the Carmel Valley Master Plan's jurisdiction. The Proposed Project would add traffic to this segment, which is projected to operate at an unacceptable LOS E and LOS F during the AM and PM peak hours. This segment is not projected to exceed the Carmel Valley Master Plan (CVMP) ADT threshold under Cumulative Plus Proposed Project conditions.

Impacts and Mitigations: The Proposed Project would add trips to a road segment already operating at a deficient LOS E and LOS F during the AM and PM peak hours. Based on the Carmel Valley Master Plan impact criteria, the Proposed Project would not have an impact on this road segment in the eastbound direction because it would not worsen the LOS by one letter grade.

The Proposed Project would have a cumulative impact in the westbound direction as it would add traffic to a road segment operating at LOS F. However, this road segment is bounded by two closely spaced signalized intersections (approximately 220 feet apart), and the flow of traffic on this segment is controlled by the adjacent signal operations, which are projected to operate at an acceptable LOS C and LOS A under Cumulative Plus Proposed Project conditions. As a result, the Proposed Project would not have an impact on this segment.

10 Alternatives Analysis

This section describes the analysis of two Project Alternatives. Project Alternative 1 involves the development of a 200-bed assisted living facility on the project site. Project Alternative 2, a scaled down version of Project Alternative 1, involves the development of a 150-bed assisted living facility. Traffic related impacts associated with the development of the Project Alternatives are discussed in this section.

10.1 Project Alternative 1 Trip Generation

Trip generation rates published by the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 9th Edition (2012) were used to estimate the trips that would be generated by the development of a 200-bed assisted living facility using the ITE Land Use Code 254, Assisted Living.

Based on the ITE trip generation rates, Project Alternative 1 is estimated to generate 538 daily trips, with 35 trips occurring during the AM peak hour (24 in, 11 out) and 57 trips occurring during the PM peak hour (28 in, 29 out). A comparison of Project Alternative 1 and the Proposed Project trip generation estimate (shown in **Exhibit 8)** indicates that Project Alternative 1 (a 200-bed assisted living facility) would generate more traffic than the Proposed Project (a 31-unit single family housing development).

A study cited by the ITE *Trip Generation Manual* found that less than 5 percent of the residents of these types of facilities owned cars, which were rarely driven. The majority of trips generated by these facilities are made by employees, visitors and delivery trucks, with very low truck traffic that for the most part occurred during the middle of the day on weekdays.

The ITE *Trip Generation Manual* also acknowledges that these types of facilities can have employee shifts that do not coincide with the peak hour of adjacent street traffic. The morning peak hour in the project study area is between 8:00 a.m. and 9:00 a.m., and the evening peak period ranges from 4:00 p.m. to 5:45 p.m. Therefore, as an example, employees working shifts beginning at 6:30 a.m., 2:30 p.m., and 10:30 p.m. would avoid being on the road in the study area during the peak commute hours. The management teams at these types of facilities typically work a more traditional office schedule, such as between 9:00 a.m. and 6:00 p.m. Management teams could avoid being on the road in the study area during the peak commute hours by adjusting their shifts, for example, to between 9:30 a.m. and 6:30 p.m.

Even with the adjusted employee shifts noted above, it is reasonable to assume that a small amount of traffic from visitors and deliveries could occur during the peak commute hours. Based on analyses at other Assisted Living facilities, 4 morning and 10 evening peak hour trips are anticipated. The Project Alternative 1 trip generation estimate is presented in **Exhibit 16** with the adjusted employee shift changes. Based on the project trip distribution shown in **Exhibit 9**, the trips generated by Project Alternative 1 were assigned to the road network and are shown in **Exhibit 17**.

10.2 Project Alternative 1 Intersection Operations

The Project Alternative 1 traffic volumes were added to the Existing, Background and Cumulative traffic volumes to obtain Existing Plus Project Alternative 1, Background Plus Project Alternative 1 and Cumulative Plus Project Alternative 1 traffic volumes. These traffic volumes are presented in **Exhibits 18**, **19 and 20**, respectively. Intersection levels of service are summarized in **Exhibit 21**. LOS calculation worksheets are included as **Appendix L**.

The lower AM and PM peak hour trip generation for Project Alternative 1 is expected to result in the same or slightly lower average delays than the Proposed Project, with the same levels of service at the study intersections. The same impacts and mitigations for the Proposed Project apply to Project Alternative 1 with the following exceptions.

Int. #3 SR 1 / Rio Road
Project Alternative 1 is not expected to have an impact at this intersection until Cumulative Plus Project Alternative 1 conditions, versus under Existing Plus Project conditions with the Proposed Project. Under Cumulative conditions the same mitigation is recommended (i.e., payment of the TAMC fee).

10.3 Project Alternative 1 Road Segment Operations

Road segment levels of service for Project Alternative 1 conditions are summarized in **Exhibit 22** (segments #1 – #5 and #11 – #15). LOS calculation worksheets for road segments #5 and #11 - #15 are included as **Appendix M**. Levels of service for study segments #1 - #4 are referenced from the worst-case levels of service reported in the *Rancho Cañada Draft Transportation Impact Study* prepared by CCTC (January 2016).

The Proposed Project is not expected to have a level of service impact on segments #6 – #10. Since Project Alternative 1 would generate fewer trips than the Proposed Project, it would also have no level of service impacts on those segments; therefore it was not necessary to perform the LOS calculations for segments #6 – #10.

Road segment Average Daily Traffic (ADT) volumes for Segments #6 – #10 are summarized in **Exhibit 23**. Segments #6 and #7 are projected to exceed the Carmel Valley Master Plan (CVMP) ADT threshold under Background and Cumulative traffic conditions. Based on the Carmel Valley Master Plan impact criteria, the project would have an impact on these road segments because they would exceed their CVMP ADT thresholds.

The lower trip generation for Project Alternative 1 is expected to result in the same levels of service on the study road segments as the Proposed Project. The same impacts and mitigations for the Proposed Project are recommended for Project Alternative 1.

10.4 Project Alternative 2 Trip Generation

Project Alternative 2 is the development of a 150-bed assisted living facility, which is a scaled down version of Project Alternative 1. Trip generation rates published by the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 9th Edition (2012) were used to estimate the trips that would be generated by the development of a 150-bed assisted living facility using the ITE Land Use Code 254, Assisted Living.

Based on the ITE trip generation rates, Project Alternative 2 is estimated to generate 401 daily trips, with 26 trips occurring during the AM peak hour (18 in, 8 out) and 43 trips occurring during the PM peak hour (21 in, 22 out). A comparison of Project Alternative 2 and the Proposed Project trip generation estimate (shown in **Exhibit 8)** indicates that Project Alternative 2 (a 150-bed assisted living facility) would generate more traffic than the Proposed Project (a 31-unit single family housing development).

As with Project Alternative 1, even with the adjusted employee shifts described in Section 10.1, it is reasonable to assume that a small amount of traffic from visitors and deliveries could occur during the peak

commute hours. Based on analyses at other Assisted Living facilities, 3 morning and 8 evening peak hour trips are anticipated. The Project Alternative 2 trip generation estimate is presented in **Exhibit 16** with the adjusted employee shift changes. Based on the project trip distribution shown in **Exhibit 9**, the trips generated by Project Alternative 2 were assigned to the road network and are shown in **Exhibit 24**.

10.5 Project Alternative 2 Intersection Operations

The Project Alternative 2 traffic volumes were added to the Existing, Background and Cumulative traffic volumes to obtain Existing Plus Project Alternative 2, Background Plus Project Alternative 2 and Cumulative Plus Project Alternative 2 traffic volumes. These traffic volumes are presented in **Exhibits 25**, **26 and 27**, respectively. Intersection levels of service are summarized in **Exhibit 28**. LOS calculation worksheets are included as **Appendix L**.

As with Project Alternative 1, the lower trip generation for Project Alternative 2 is expected to result in the same or slightly lower average delays than the Proposed Project, with the same levels of service at the study intersections. For intersection operations, the same impacts and mitigations for Project Alternative 1 apply to Project Alternative 2.

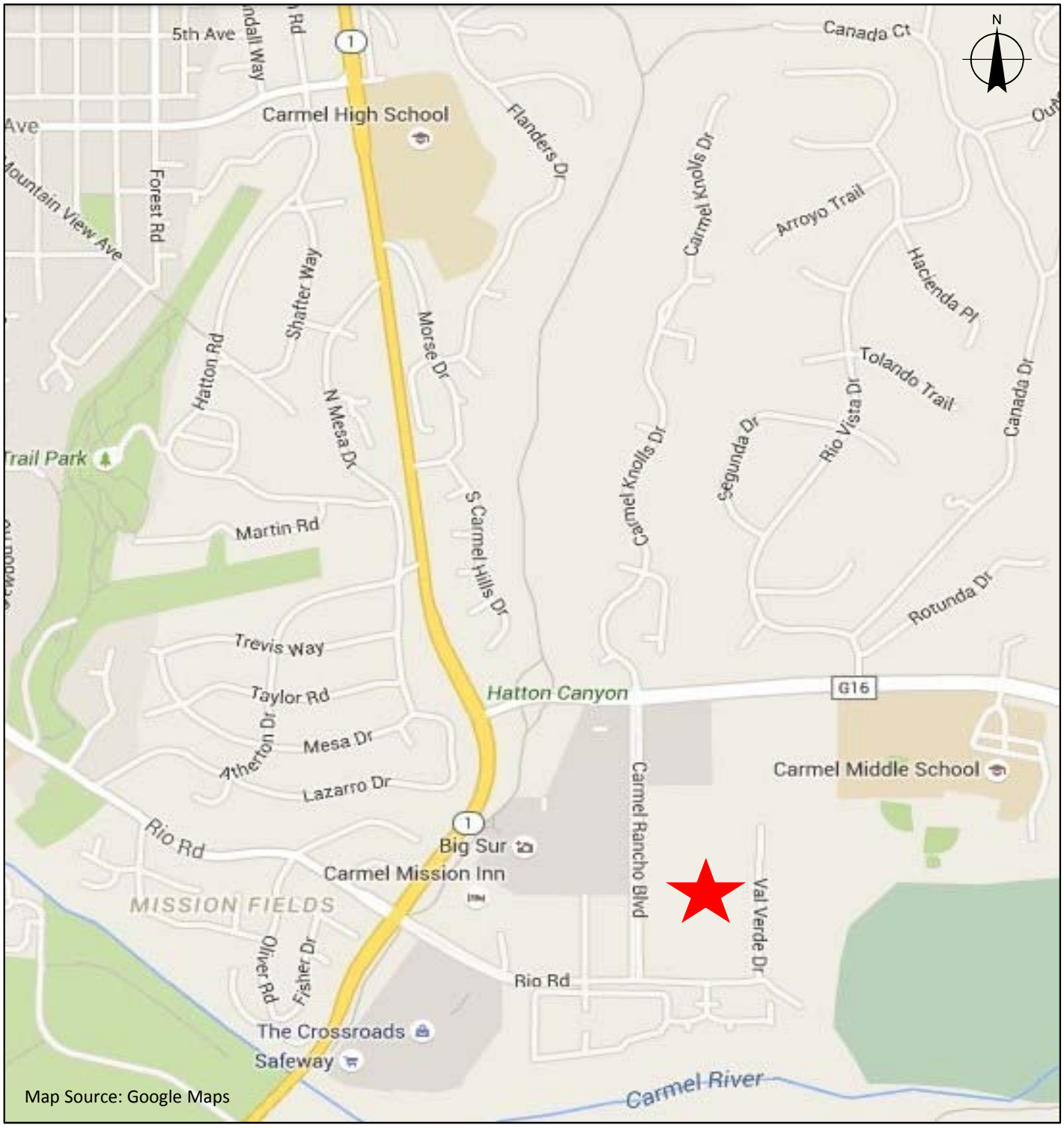
10.6 Project Alternative 2 Road Segment Operations

Road segment levels of service for Project Alternative 2 conditions are summarized in **Exhibit 29** (segments #1 – #5 and #11 – #15). LOS calculation worksheets for road segments #5 and #11 - #15 are included as **Appendix M**. Levels of service for study segments #1 - #4 are referenced from the worst-case levels of service reported in the *Rancho Cañada Draft Transportation Impact Study* prepared by CCTC (January 2016).

The Proposed Project is not expected to have a level of service impact on segments #6 – #10. Since Project Alternative 2 would generate fewer trips than the Proposed Project, it would also have no level of service impacts on those segments; therefore it was not necessary to perform the LOS calculations for segments #6 – #10.

Road segment Average Daily Traffic (ADT) volumes for Segments #6 – #10 are summarized in **Exhibit 30**. Segments #6 and #7 are projected to exceed the Carmel Valley Master Plan (CVMP) ADT threshold under Background and Cumulative traffic conditions. Based on the Carmel Valley Master Plan impact criteria, the project would have an impact on these road segments because they would exceed their CVMP ADT thresholds.

The lower trip generation for Project Alternative 2 is expected to result in the same or slightly higher travel speeds than the Proposed Project, with the same levels of service on the study road segments. The same impacts and mitigations for Project Alternative 1 apply to Project Alternative 2.



LEGEND

★ Project Location

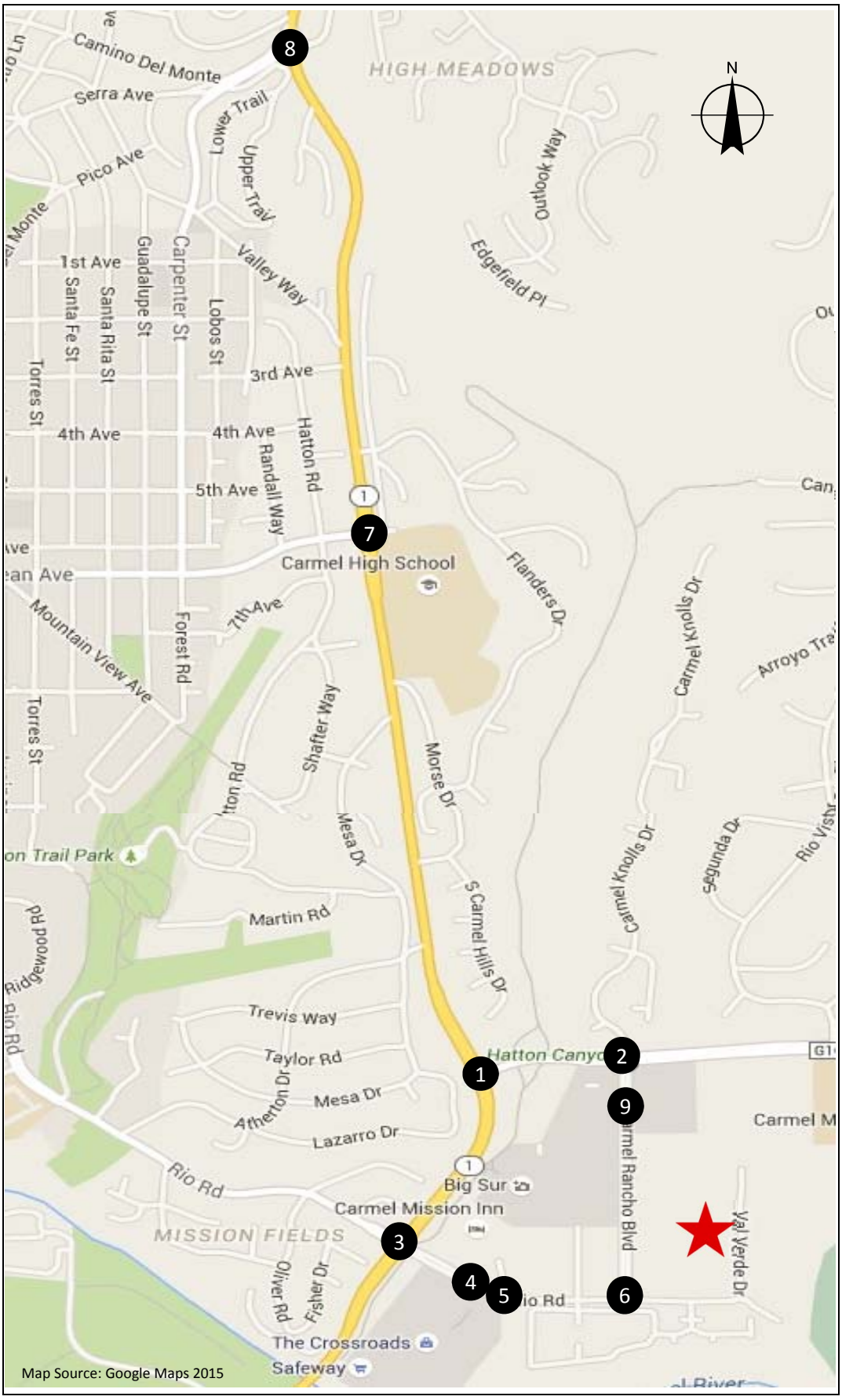
Source: Bestor Engineers, Inc.

Hatch Mott MacDonald

\\Gil-data-vm\fileserver\2015\Jobs\358717 - Carmel Rio Subdivision\Exhibits\9-24-15 Draft Report\358717 Exhibits.xlsx

Exhibit 2

Proposed Project Site Plan



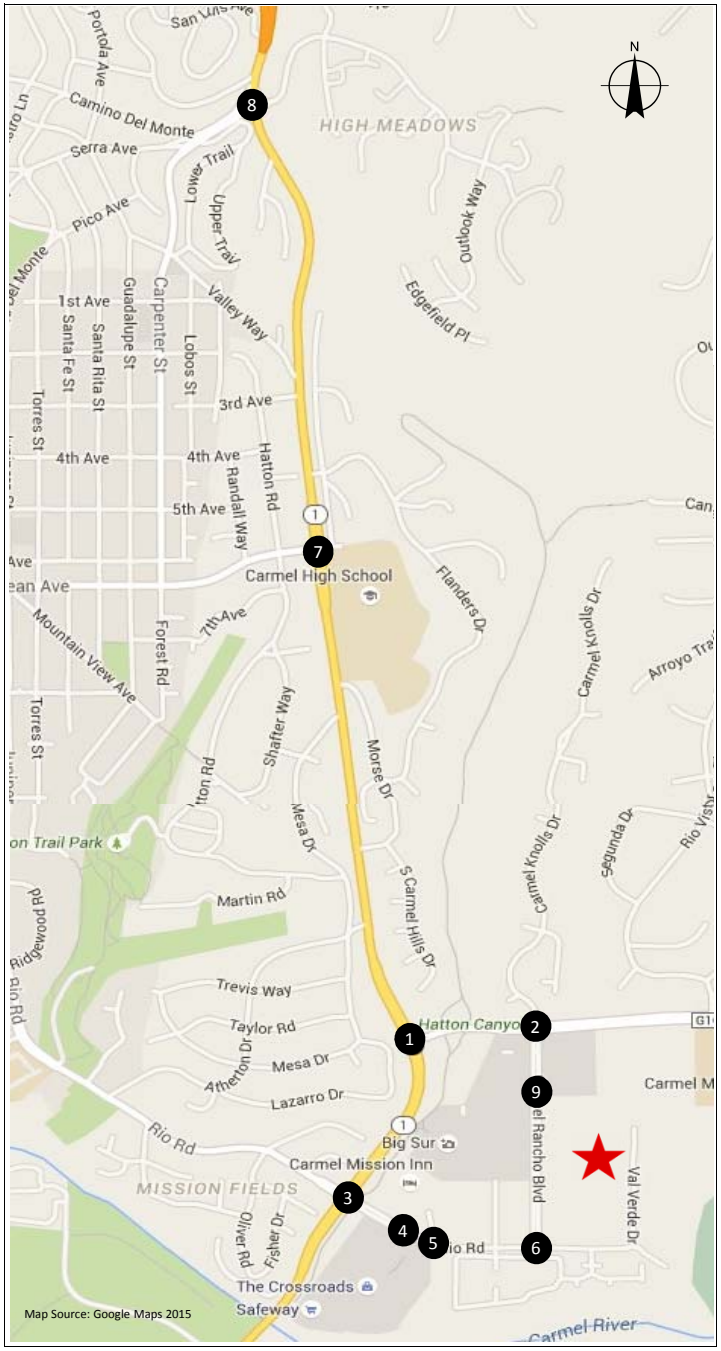
Project Location

Hatch Mott MacDonald

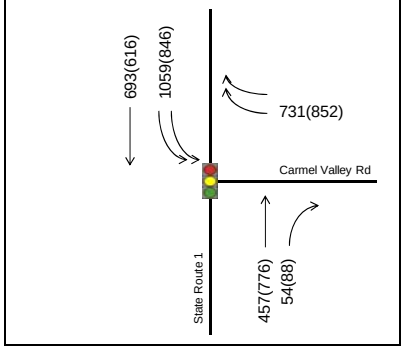
\\Gil-data-vm\fileserver\2015\Jobs\358717 - Carmel Rio Subdivision\Exhibits\358717 Exhibits.xlsx

Exhibit 3

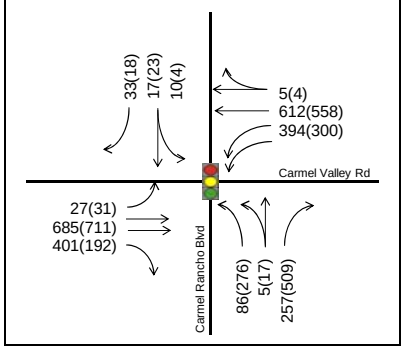
Study Intersections



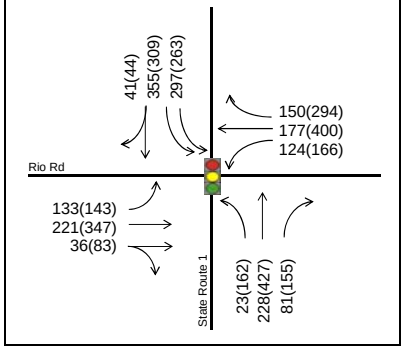
1. SR 1 / Carmel Valley Rd



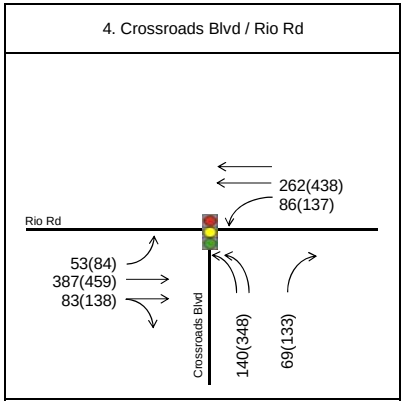
2. Carmel Rancho Blvd / Carmel Valley Rd



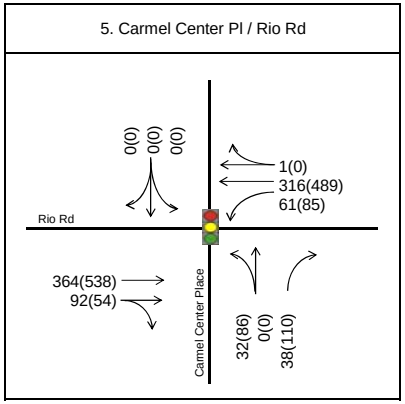
3. SR 1 / Rio Rd



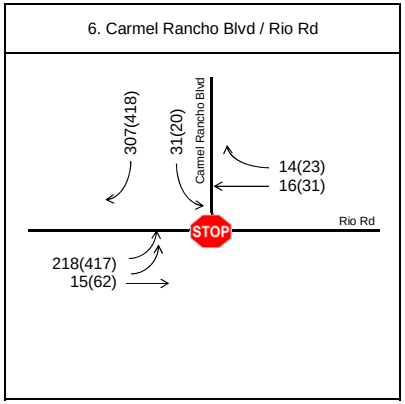
4. Crossroads Blvd / Rio Rd



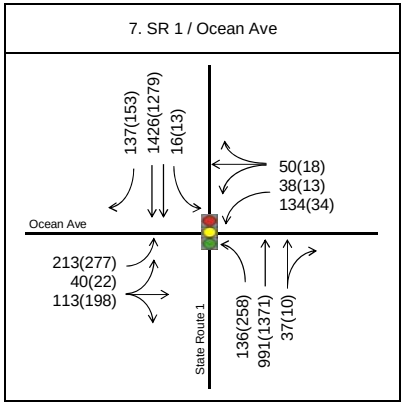
5. Carmel Center Pl / Rio Rd



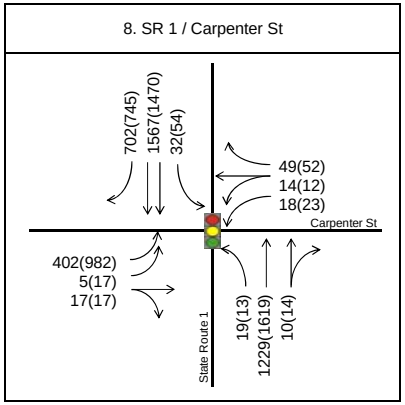
6. Carmel Rancho Blvd / Rio Rd



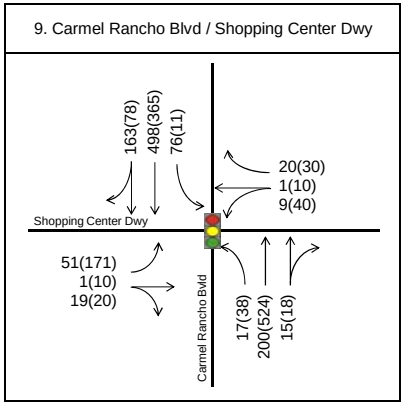
7. SR 1 / Ocean Ave



8. SR 1 / Carpenter St



9. Carmel Rancho Blvd / Shopping Center Dwy



LEGEND

Project Location

Traffic Signal

Study Intersection #

Stop Control

Lane Configuration

XX(YY) = AM (PM)
Counts conducted 7/15 & 8/15,
adjusted & balanced.

Hatch Mott MacDonald

\\Gil-data-vm\fileserver\2015\Jobs\358717 - Carmel Rio Subdivision\Exhibits\10-30-15 Final Draft Report\358717 Volumes_rev1.xls

Exhibit 4
Existing Conditions
AM & PM Peak Hour Volumes

	N-S Street	E-W Street	Existing Lane Configuration[1, 2]	Existing Intersection Control	LOS Standard Jurisdiction	Existing Conditions				Existing Plus Project Conditions				Background Conditions				Background Plus Project Conditions				Cumulative Conditions				Cumulative Plus Project Conditions			
						AM Pk Hr.		PM Pk Hr.		AM Pk Hr.		PM Pk Hr.		AM Pk Hr.		PM Pk Hr.		AM Pk Hr.		PM Pk Hr.		AM Pk Hr.		PM Pk Hr.		AM Pk Hr.		PM Pk Hr.	
						Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
1	SR 1	Carmel Valley Road	NB 1-T, 1-R SB 2-L, 1-T WB 2-R *With RTP Improvements*	Signal	C/D Caltrans	11.3	B	18.1	B	11.4	B	18.2	B	11.9	B	21.0	C	12.0	B	21.1	C	14.1	B	43.5	D	14.3 *9.6*	B *A*	44.0 *18.3*	D *B*
2	Carmel Rancho Blvd	Carmel Valley Road	NB 1-L, 1-L/T, 1-R SB 1-L/T, 1-R EB 1-L, 2-T, 1-R WB 2-L, 1-T, 1-T/R	Signal	C CVMP	16.9	B	19.3	B	17.0	B	19.4	B	18.4	B	20.2	C	18.4	B	20.2	C	22.0	C	22.6	C	22.2	C	22.7	C
3	SR 1	Rio Road	NB 1-L, 1-T, 1-R SB 2-L, 1-T/R EB 1-L, 1-T, 1-T/R WB 1-L, 1-T, 1-R *With RTP Improvements*	Signal	C/D Caltrans	22.6	C	37.9	D	22.8 *21.5*	C *C*	38.0 *33.8*	D *C*	22.8	C	38.6	D	22.9 *21.6*	C *C*	38.7 *34.2*	D *C*	26.7	C	54.0	D	26.9 *24.2*	C *C*	54.4 *41.0*	D *D*
4	Crossroads Blvd	Rio Road	NB 2-L, 1-T/R EB 1-L, 1-T, 1-T/R WB 1-L, 2-T	Signal	C CVMP	9.9	A	12.0	B	9.9	A	11.9	B	10.2	B	12.5	B	10.1	B	12.5	B	20.2	C	32.9	C	20.1	C	32.7	C
5	Carmel Center Place	Rio Road	NB 1-L/T, 1-R SB 1-L/T/R EB 1-T, 1-T/R WB 1-L, 1-T, 1-T/R	Signal	C CVMP	9.3	A	6.0	A	9.3	A	6.0	A	9.1	A	5.9	A	9.1	A	5.9	A	6.1	A	7.8	A	6.1	A	7.8	A
6	Carmel Rancho Blvd	Rio Road	SB 1-L, 1-R EB 2-L, 1-T WB 1-T, 1-R	Two-Way Stop SB EB WB	C CVMP	10.2 7.7 15.2	B A C	10.7 8.1 19.8	B A C	10.2 7.7 15.7	B A C	10.7 8.1 19.5	B A C	10.4 7.8 15.9	B A C	10.9 8.1 20.8	B A C	10.4 7.8 16.5	B A C	10.9 8.1 20.4	B A C	10.9 7.8 17.7	B A C	11.7 8.3 23.5	B A C	10.9 7.8 18.3	B A C	11.7 8.3 22.2	B A C
7	SR 1	Ocean Avenue	NB 1-L, 1-T, 1-T/R SB 1-L, 2-T, 1-R EB 1-L, 1-L/T/R WB 1-L, 1-L/T/R	Signal	C/D Caltrans	43.6	D	37.1	D	**44.1**	**D**	**37.5**	**D**	49.8	D	43.1	D	**50.3**	**D**	**43.7**	**D**	71.4	E	67.5	E	**71.8**	**E**	**68.4**	**E**
8	SR 1	Carpenter Street	NB 1-L, 1-T, 1-T/R SB 1-L, 2-T, 1-R EB 2-L, 1-T/R WB 1-L, 1-L/T, 1-R *With NB RT Lane*	Signal	C/D Caltrans	23.8	C	47.1	D	23.8 *23.8*	C *C*	47.4 *46.3*	D *D*	25.0	C	52.4	D	25.1 *24.9*	C *C*	52.8 *50.1*	D *D*	32.3	C	77.2	E	32.4 *30.4*	C *C*	77.9 *67.9*	E *E*
9	Carmel Rancho Blvd	Shopping Center Dwy	NB 1-L, 1-T, 1-T/R SB 1-L, 1-T, 1-T/R EB 1-L, 1-T/R WB 1-L/T, 1-R	Signal	C CVMP	4.0	A	5.5	A	4.0	A	5.6	A	4.0	A	5.6	A	4.0	A	5.7	A	4.0	A	5.8	A	4.0	A	5.8	A

Notes:

1 L, T, R = Left, Through, Right
2 NB, SB, EB, WB = Northbound, Southbound, Eastbound, Westbound
3 Level of service highlighted in red indicates that LOS exceeds the LOS standard.
4 Yellow highlight indicates project impact.
5 Bold type indicates unmitigated impact.

Hatch Mott MacDonald

\\Gil-data-vm\fileserver\2015\Jobs\358717 - Carmel Rio Subdivision\Exhibits\1-29-16 Draft Report\358717 Int LOS_rev1.xlsx

Exhibit 5
Proposed Project Scenarios
Intersection Levels of Service

Seg #	Road Segment	Existing AM vs Existing + Project AM				Existing PM vs Existing + Project PM				Background AM vs Background + Project AM				Background PM vs Background + Project PM				Cumulative AM vs Cumulative + Project AM				Cumulative PM vs Cumulative + Project PM			
		Existing AM		Exist+Proj AM		Existing PM		Exis+Proj PM		Background AM		Back+Proj AM		Background PM		Back+Proj PM		Cumulative AM		Cum+Proj AM		Cumulative PM		Cum+Proj PM	
	NB Carmel Rancho Blvd	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	27.3	A	27.3	A	24.9	B	24.9	B	27.3	A	27.3	A	24.8	B	24.8	B	27.2	A	27.3	A	24.6	B	24.7	B
11	From Shopping Center Dwy to Carmel Valley Rd	9.5	D	9.5	D	8.9	E	8.9	E	9.2	D	9.2	D	8.6	E	8.5	E	9.1	D	9.1	D	8.3	E	8.2	E
	Total	17.5	C	17.5	C	16.2	C	16.2	C	17.2	C	17.2	C	15.8	C	15.8	C	17.1	C	17.1	C	15.4	C	15.4	C
	SB Carmel Rancho Blvd	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	18.3	C	18.3	C	16.8	C	16.8	C	18.2	C	18.2	C	16.7	C	16.6	C	18.1	C	18.1	C	16.4	C	16.5	C
12	From Shopping Center Dwy to Rio Rd	22.9	B	22.9	B	22.6	B	22.6	B	22.8	B	22.8	B	22.5	B	22.5	B	22.5	B	22.5	B	22.1	B	22.1	B
	Total	21.3	B	21.3	B	20.5	B	20.5	B	21.2	B	21.2	B	20.4	B	20.4	B	21.0	B	21.0	B	20.0	B	20.1	B
	EB Rio Rd	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	17.3	C	17.3	C	17.3	C	17.3	C	17.3	C	17.3	C	17.3	C	17.3	C	17.1	C	17.1	C	17.0	C	17.0	C
13	From SR 1 to Crossroads Blvd	12.9	D	12.9	D	11.7	D	11.7	D	12.6	D	12.6	D	11.7	D	11.6	D	10.9	D	10.9	D	9.2	D	9.1	D
14	From Crossroads Blvd to Carmel Center Pl	12.2	D	12.2	D	11.0	D	11.0	D	12.1	D	12.1	D	10.9	D	10.9	D	8.9	E	8.9	E	7.8	E	7.8	E
15	From Carmel Center Pl to Carmel Rancho Blvd	16.1	C	16.1	C	17.1	C	17.1	C	16.0	C	16.0	C	17.1	C	17.1	C	16.0	C	16.0	C	17.0	C	17.0	C
	Total	15.8	C	15.8	C	15.7	C	15.7	C	15.8	C	15.8	C	15.6	C	15.6	C	14.9	C	14.8	C	14.3	C	14.3	C
	WB Rio Rd	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	20.3	B	20.3	B	19.6	B	19.6	B	20.3	B	20.3	B	19.6	B	19.6	B	20.2	B	20.3	B	19.6	B	19.6	B
14	From Carmel Center Pl to Crossroads Blvd	9.6	D	9.6	D	8.3	E	8.3	E	9.6	D	9.6	D	8.4	E	8.3	E	6.8*	F	6.8*	F	4.8*	F	4.8*	F
13	From Crossroads Blvd to SR 1	7.3	E	7.3	E	7.2	E	7.2	E	7.3	E	7.3	E	7.2	E	7.2	E	7.2	E	7.2	E	6.9	F	6.9	F
5	From SR 1 to Atherton Dr	19.6	B	23.5	B	23.5	B	23.5	B	23.5	B	23.5	B	23.5	B	23.5	B	23.5	B	23.5	B	23.5	B	23.5	B
	Total	15.1	C	16.3	C	15.9	C	15.9	C	16.3	C	16.3	C	15.9	C	15.9	C	15.6	C	15.6	C	14.6	C	14.5	C
	NB SR 1	Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS	
1	From Ocean Ave to Carpenter St	C		C		D		D		C		C		D		D		C		C		D		D	
2	From Carmel Valley Rd to Ocean Ave	C		C		C		C		F		F		C		C		F		F		C		C	
3	From Rio Rd to Carmel Valley Rd	F		F		F		F		F		F		F		F		F		F		F		F	
4	From Ribera Rd to Rio Rd	B		B		B		B		B		B		B		B		B		B		B		B	
	SB SR 1	Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS	
1	From Carpenter St to Ocean Ave	D		D		C		C		D		D		C		C		D		D		C		C	
2	From Ocean Ave to Carmel Valley Rd	C		C		C		C		C		C		C		C		C		C		C		C	
3	From Carmel Valley Rd to Rio Rd	C		C		E		E		C		C		E		E		C		C		E		E	
4	From Rio Rd to Ribera Rd	B		B		B		B		B		B		B		B		B		B		B		B	

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.
2. Text highlighted in yellow indicates potential project impact.
3. * = Traffic flow on this segment is controlled by closely spaced intersections that operate acceptably. Therefore, project does not have an impact.
4. SR 1 road segment levels of service are referenced from the *Rancho Cañada Draft Transportation Impact Study Report* prepared by Central Coast Transportation Consulting (CCTC, January 2015)

Carmel Valley Road				Existing Conditions							Existing Plus Project Conditions							Background Conditions						
					AM Peak Hour			PM Peak Hour				AM Peak Hour			PM Peak Hour				AM Peak Hour			PM Peak Hour		
Segment	From	To	CVMP ADT Threshold	ADT	2-Way Volume	PTSF	LOS	2-Way Volume	PTSF	LOS	ADT	2-Way Volume	PTSF	LOS	2-Way Volume	PTSF	LOS	ADT	2-Way Volume	PTSF	LOS	2-Way Volume	PTSF	LOS
6	Robinson Canyon Rd	Schulte Rd	15,499	14,611	1,070	85.3%	E	1,293	85.3%	E	14,654	1,073	85.2%	E	1,298	85.0%	E	15,847	1,165	86.2%	E	1,429	86.5%	E
7	Schulte Rd	Rancho San Carlos Rd	16,340	15,974	1,157	87.3%	E	1,402	87.7%	E	16,017	1,160	87.0%	E	1,407	87.5%	E	17,865	1,305	89.6%	E	1,610	90.0%	E

Carmel Valley Road				Background + Project Conditions							Cumulative Conditions							Cumulative + Project Conditions						
					AM Peak Hour			PM Peak Hour				AM Peak Hour			PM Peak Hour				AM Peak Hour			PM Peak Hour		
Segment	From	To	CVMP ADT Threshold	ADT	2-Way Volume	PTSF	LOS	2-Way Volume	PTSF	LOS	ADT	2-Way Volume	PTSF	LOS	2-Way Volume	PTSF	LOS	ADT	2-Way Volume	PTSF	LOS	2-Way Volume	PTSF	LOS
6	Robinson Canyon Rd	Schulte Rd	15,499	**15,890**	1,168	86.1%	E	1,434	86.3%	E	17,107	1,242	87.7%	E	1,555	88.0%	E	**17,150**	1,245	87.8%	E	1,560	87.9%	E
7	Schulte Rd	Rancho San Carlos Rd	16,340	**17,908**	1,308	89.3%	E	1,615	90.1%	E	19,125	1,382	89.4%	E	1,736	90.7%	E	**19,168**	1,385	89.5%	E	1,741	90.6%	E

Carmel Valley Road				Existing Conditions									Existing Plus Project Conditions										Background Conditions									
						AM Peak Hour				PM Peak Hour						AM Peak Hour				PM Peak Hour						AM Peak Hour				PM Peak Hour			
Segment	From	To	CVMP ADT Threshold	ADT	Direction	Volume (veh/hr)	Flow Rate (pcphpl)	Density pc/mi/ln	LOS	Volume (veh/hr)	Flow Rate (pcphpl)	Density pc/mi/ln	LOS	ADT	Direction	Volume (veh/hr)	Flow Rate (pcphpl)	Density pc/mi/ln	LOS	Volume (veh/hr)	Flow Rate (pcphpl)	Density pc/mi/ln	LOS	ADT	Direction	Volume (veh/hr)	Flow Rate (pcphpl)	Density pc/mi/ln	LOS	Volume (veh/hr)	Flow Rate (pcphpl)	Density pc/mi/ln	LOS
8	Rancho San Carlos Rd	Rio Rd	48,487	18,982	EB	547	298	5.4	A	900	524	9.5	A	19,025	EB	549	299	5.4	A	902	525	9.5	A	21,046	EB	625	340	6.2	A	1,020	594	10.8	A
					WB	815	485	8.8	A	727	396	7.2	A		WB	816	486	8.8	A	730	398	7.2	A		WB	915	545	9.9	A	834	454	8.3	A
9	Rio Rd	Carmel Rancho Blvd	51,401	24,228	EB	706	393	7.1	A	1,100	606	11.0	B	24,271	EB	708	395	7.2	A	1,102	607	11.0	B	26,319	EB	779	433	7.9	A	1,223	673	12.2	B
					WB	993	598	10.9	A	938	506	9.2	A		WB	994	599	10.9	A	941	507	9.2	A		WB	1,090	657	11.9	B	1,045	563	10.2	A
10	Carmel Rancho Blvd	SR 1	27,839	22,006	EB	944	514	9.3	A	846	442	8.0	A	22,137	EB	946	515	9.4	A	848	443	8.1	A	23,606	EB	1,006	548	10.0	A	945	494	9.0	A
					WB	789	470	8.5	A	962	530	9.6	A		WB	790	470	8.5	A	965	531	9.7	A		WB	860	512	9.3	A	1,039	572	10.4	A

Carmel Valley Road				Background Plus Project									Cumulative Conditions										Cumulative Plus Project Conditions									
						AM Peak Hour				PM Peak Hour						AM Peak Hour				PM Peak Hour						AM Peak Hour				PM Peak Hour			
Segment	From	To	CVMP ADT Threshold	ADT	Direction	Volume (veh/hr)	Flow Rate (pcphpl)	Density pc/mi/ln	LOS	Volume (veh/hr)	Flow Rate (pcphpl)	Density pc/mi/ln	LOS	ADT	Direction	Volume (veh/hr)	Flow Rate (pcphpl)	Density pc/mi/ln	LOS	Volume (veh/hr)	Flow Rate (pcphpl)	Density pc/mi/ln	LOS	ADT	Direction	Volume (veh/hr)	Flow Rate (pcphpl)	Density pc/mi/ln	LOS	Volume (veh/hr)	Flow Rate (pcphpl)	Density pc/mi/ln	LOS
8	Rancho San Carlos Rd	Rio Rd	48,487	21,089	EB	627	341	6.2	A	1,022	595	10.8	A	22,706	EB	670	365	6.6	A	1,099	640	11.6	B	22,749	EB	672	366	6.7	A	1,101	641	11.7	B
					WB	916	545	9.9	A	837	456	8.3	A		WB	963	573	10.4	A	921	502	9.1	A		WB	964	574	10.4	A	924	503	9.1	A
9	Rio Rd	Carmel Rancho Blvd	51,401	26,362	EB	781	435	7.9	A	1,225	675	12.3	B	28,699	EB	830	462	8.4	A	1,354	746	13.6	B	28,742	EB	832	463	8.4	A	1,356	747	13.6	B
					WB	1,091	657	11.9	B	1,048	565	10.3	A		WB	1,188	716	13.0	B	1,152	621	11.3	B		WB	1,189	716	13.0	B	1,155	623	11.3	B
10	Carmel Rancho Blvd	SR 1	27,839	23,737	EB	1,008	549	10.0	A	947	495	9.0	A	24,626	EB	1,032	562	10.2	A	1,009	527	9.6	A	24,757	EB	1,034	563	10.2	A	1,011	528	9.6	A
					WB	861	513	9.3	A	1,042	574	10.4	A		WB	911	542	9.9	A	1,077	593	10.8	A		WB	912	543	9.9	A	1,080	595	10.8	A

Notes:

1. LOS/ADT highlighted in red indicates LOS/ADT exceeds LOS/ADT standard/threshold.

1. ADT highlighted in yellow indicates ADT exceeds Carmel Valley Master Plan (CVMP) ADT Threshold and is a project impact.

2. PTSF = Percent Time Spent Following.

3. Bold type indicates unmitigated impact.

Hatch Mott MacDonald

Exhibit 7

Proposed Project Scenarios

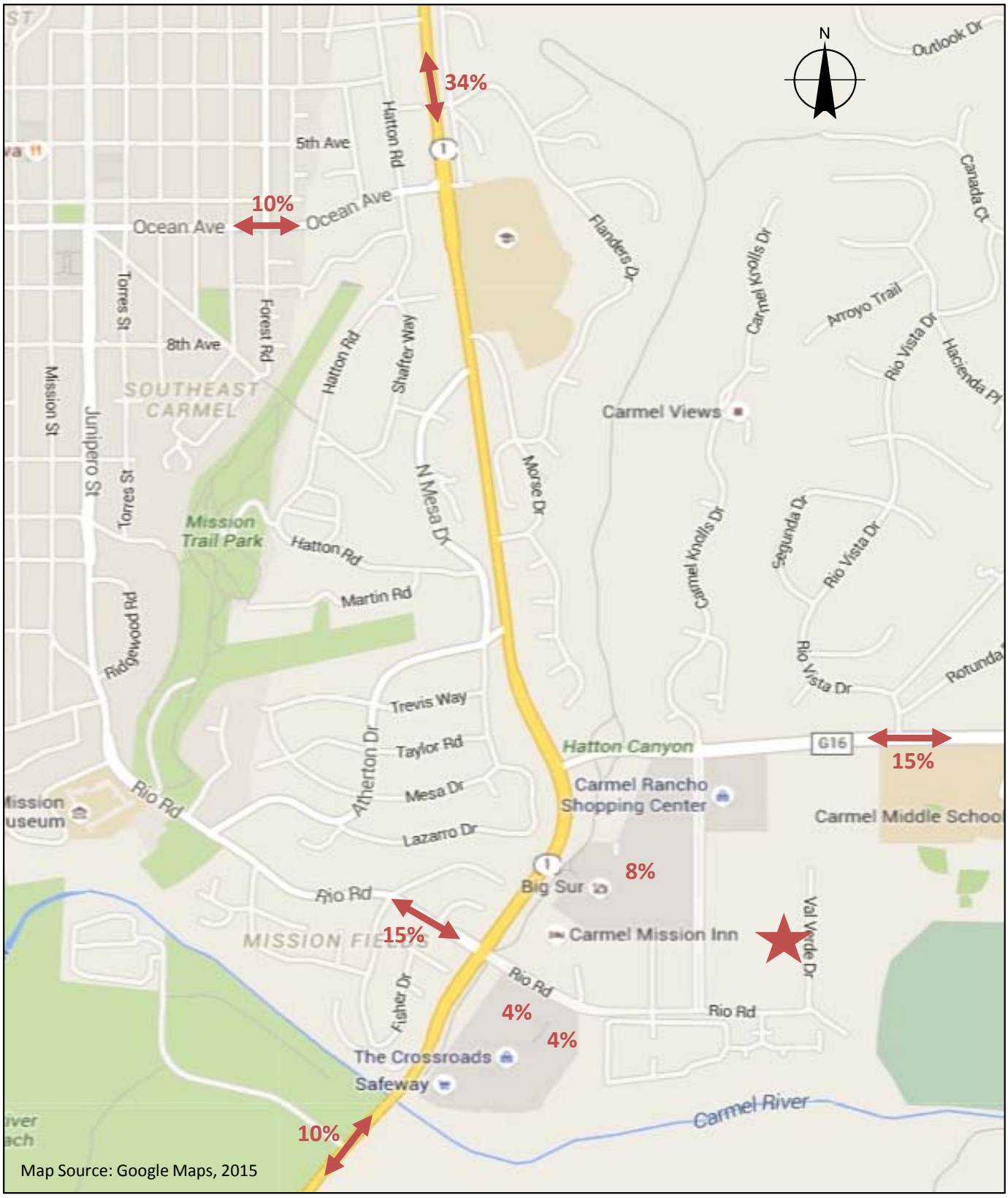
Road Segment Levels of Service

Segments 6 - 10

TRIP GENERATION RATES (per DU)[1]	LAND USE CODE	DAILY TRIP RATE	AM PEAK HOUR				PM PEAK HOUR			
			PEAK HOUR RATE	% OF ADT	% IN	% OUT	PEAK HOUR RATE	% OF ADT	% IN	% OUT
Single-Family Detached Housing	210	9.52	0.75	8%	25%	75%	1.00	11%	63%	37%
PROPOSED USE	**PROJECT SIZE**	**DAILY TRIPS**	**AM PEAK HOUR**				**PM PEAK HOUR**			
			PEAK HOUR TRIPS	% OF ADT	TRIPS IN	TRIPS OUT	PEAK HOUR TRIPS	% OF ADT	TRIPS IN	TRIPS OUT
Single-Family Detached Housing	31 DU	295	23	8%	6	17	31	11%	20	11
Gross Trips Generated		295	23		6	17	31		20	11
CREDIT FOR EXISTING USE	**PROJECT SIZE**	**DAILY TRIPS**	**AM PEAK HOUR**				**PM PEAK HOUR**			
			PEAK HOUR TRIPS	% OF ADT	TRIPS IN	TRIPS OUT	PEAK HOUR TRIPS	% OF ADT	TRIPS IN	TRIPS OUT
Single-Family Detached Housing	-1 DU	-10	-1	10%	0	-1	-1	10%	-1	0
Total Net New Trips Generated		**285**	**22**		**6**	**16**	**30**		**19**	**11**

Notes:

1. Trip generation rates per dwelling unit (DU), published by Institute of Transportation Engineers (ITE) "Trip Generation Manual," 9th Edition, 2012.



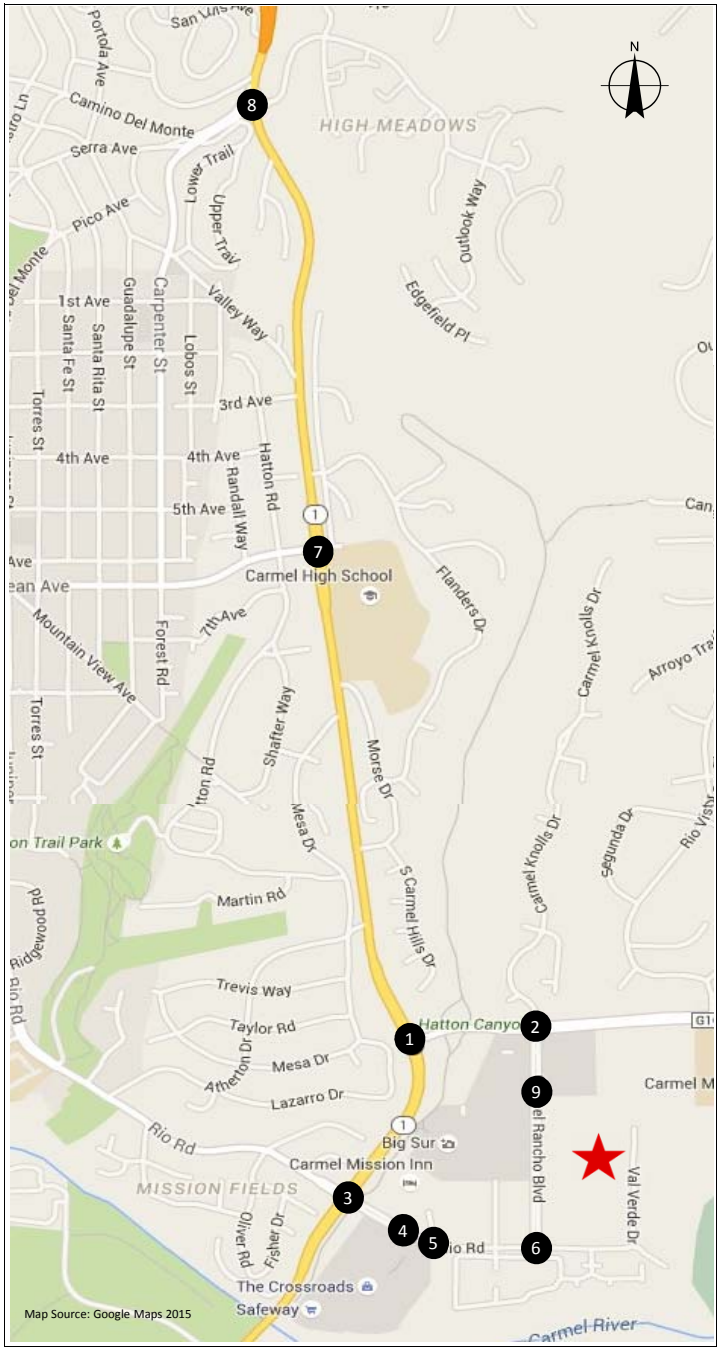
= Project Site

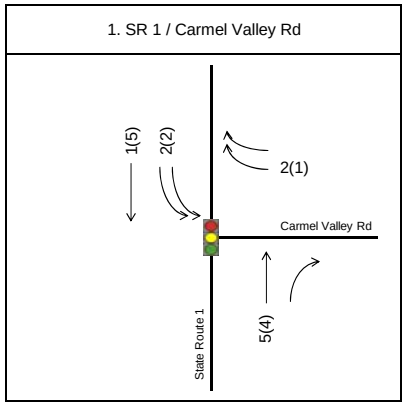
Hatch Mott MacDonald

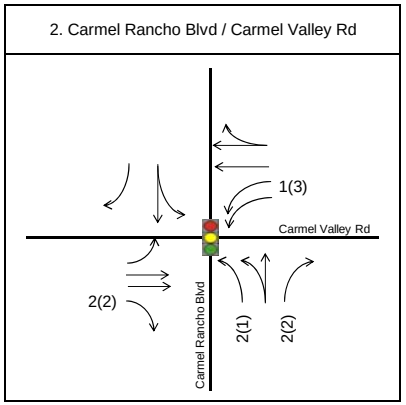
358717 Trip Dist.xlsx

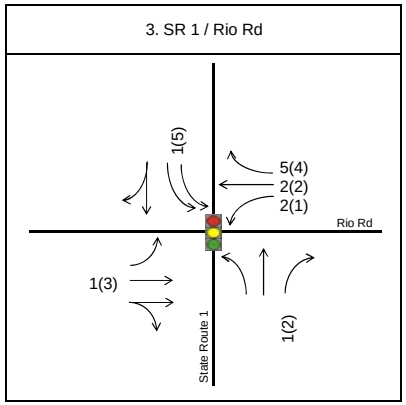
Exhibit 9

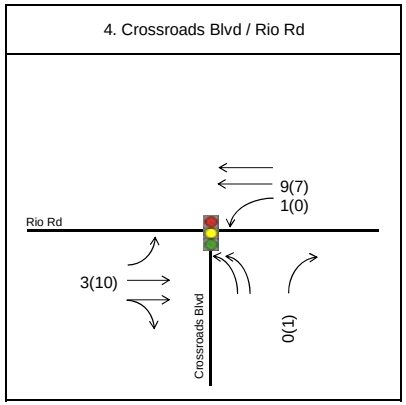
Project Trip Distribution

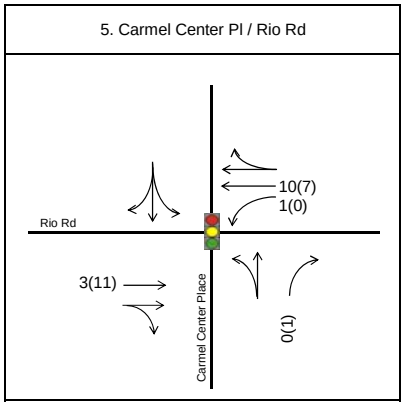


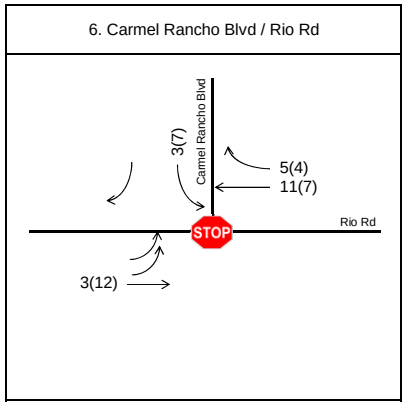


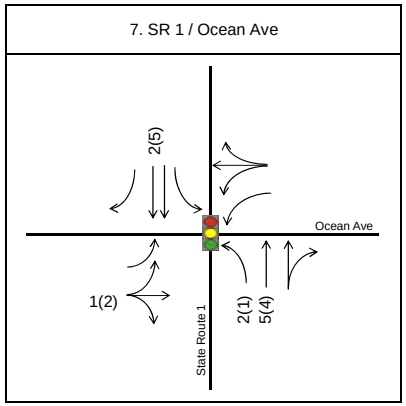


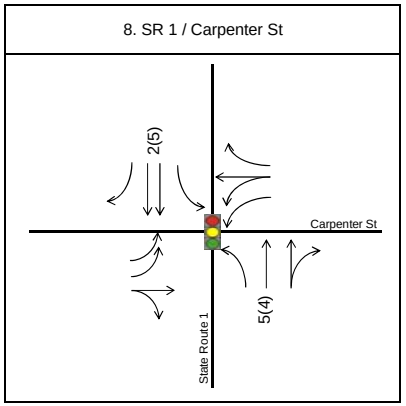


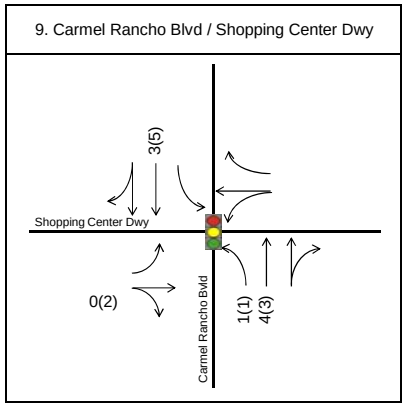










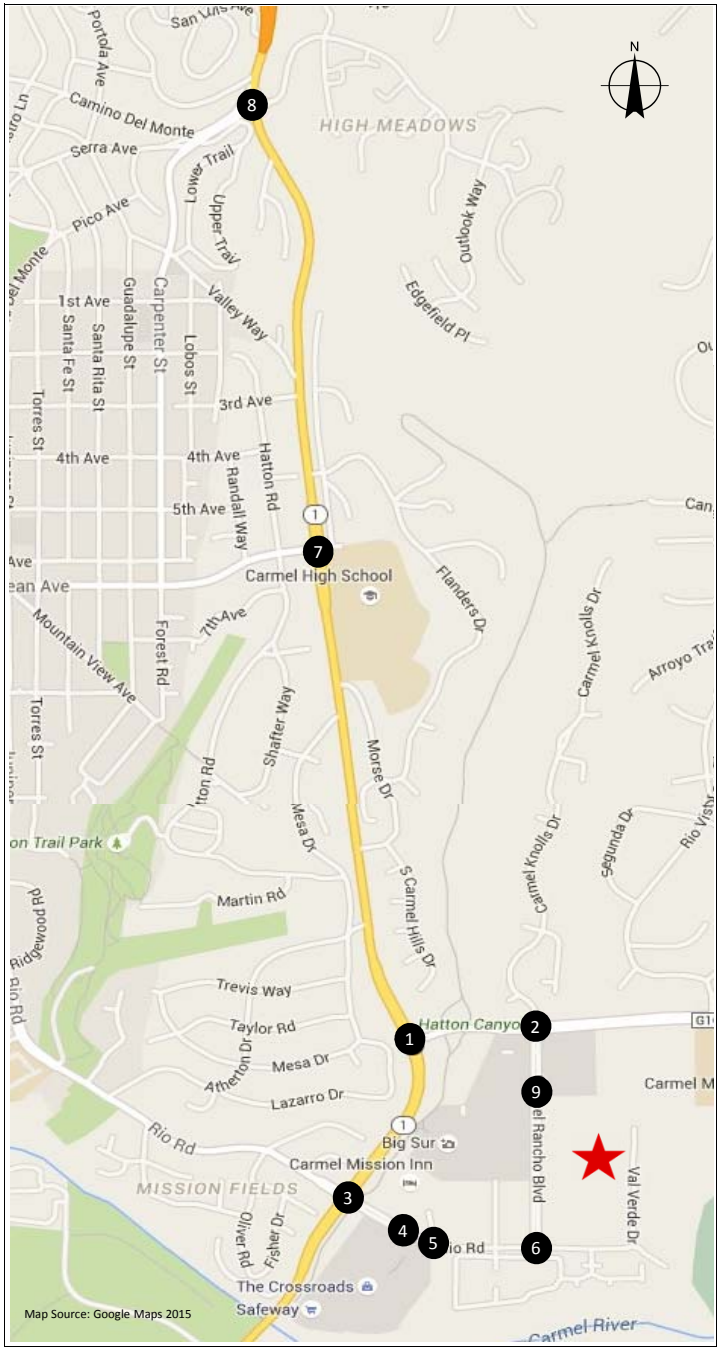


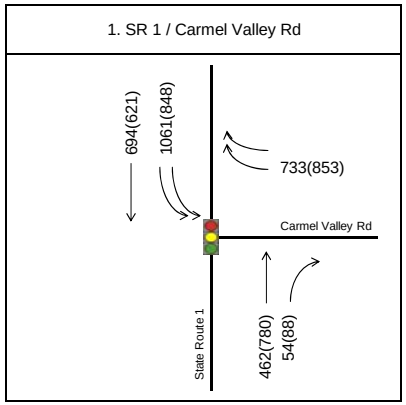
XX (YY) = AM (PM)

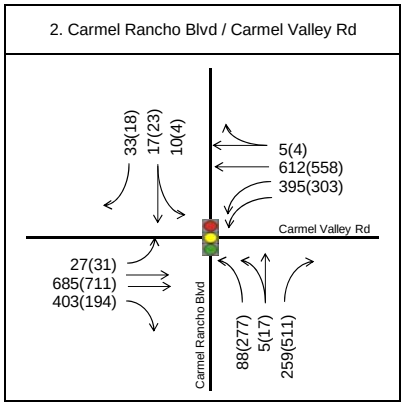
Hatch Mott MacDonald

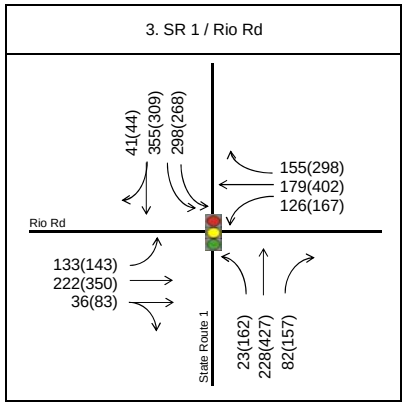
\\Gil-data-vm\fileserver\2015\Jobs\358717 - Carmel Rio Subdivision\Exhibits\1-29-16 Draft Report\358717 Volumes_rev1.xls

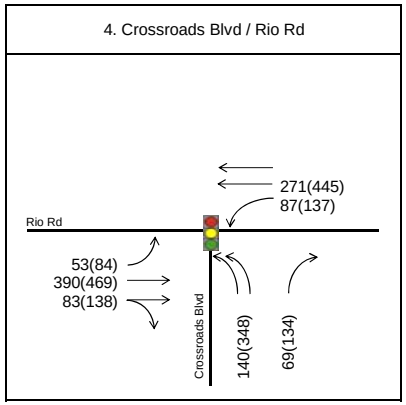
Exhibit 10
Proposed Project Trip Assignment
AM & PM Peak Hour Volumes

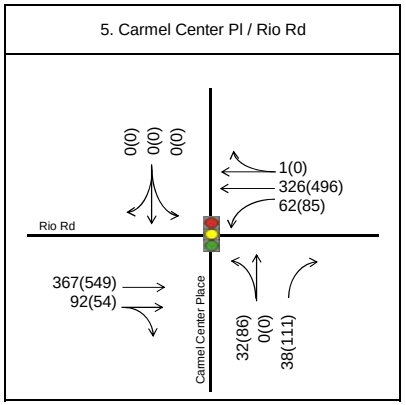


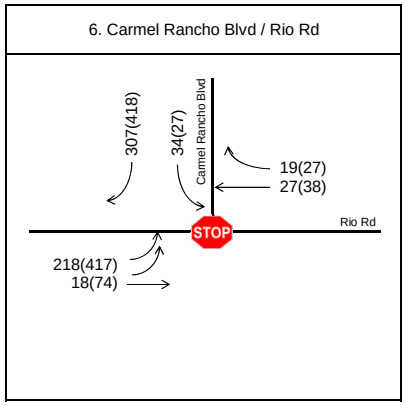


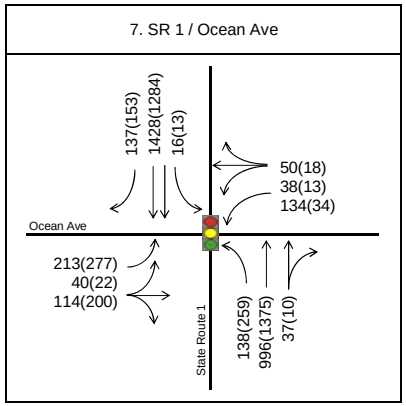


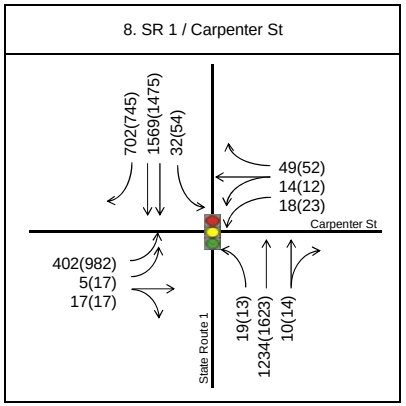


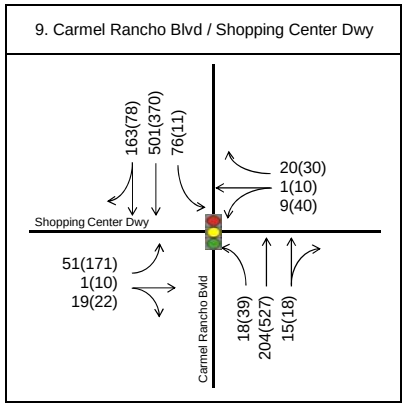












XX (YY) = AM (PM)

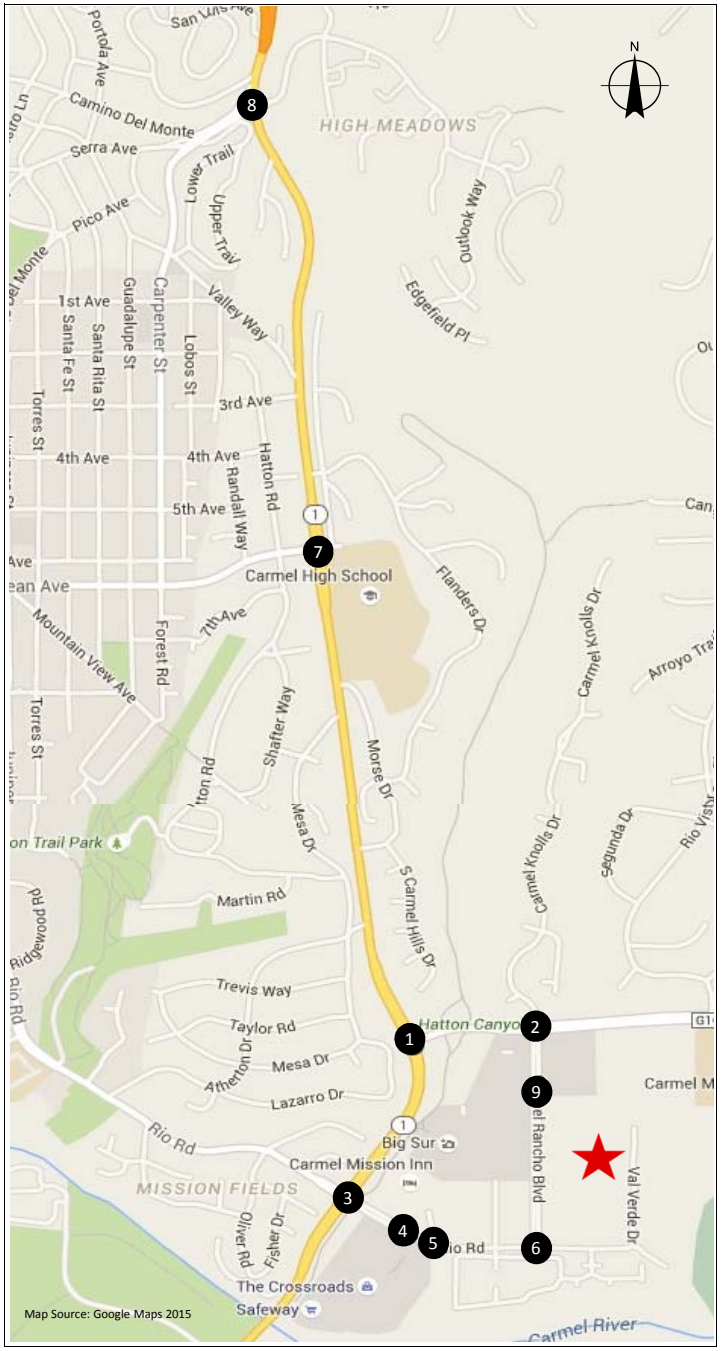
Hatch Mott MacDonald

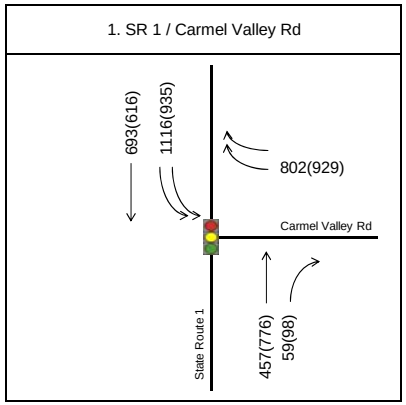
\\Gil-data-vm\fileserver\2015\Jobs\358717 - Carmel Rio Subdivision\Exhibits\1-29-16 Draft Report\358717 Volumes_rev1.xls

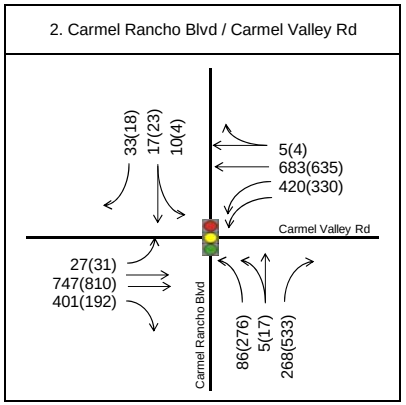
Exhibit 11

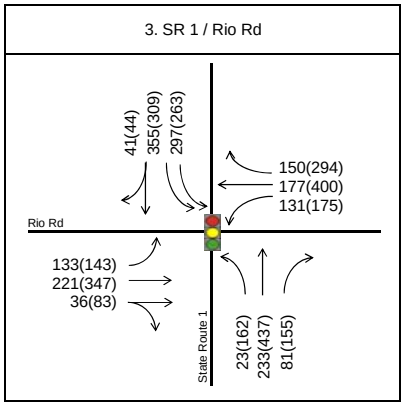
Existing Plus Proposed Project Conditions

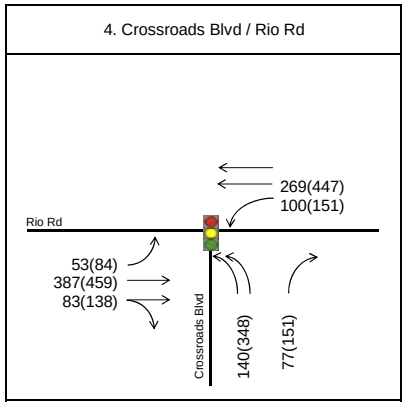
AM & PM Peak Hour Volumes

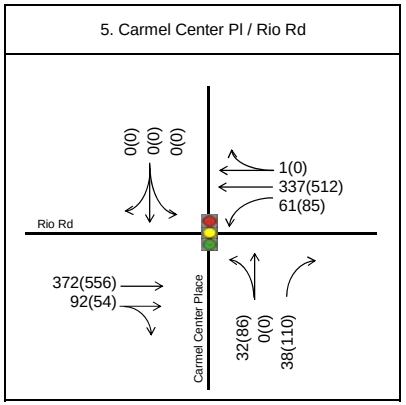


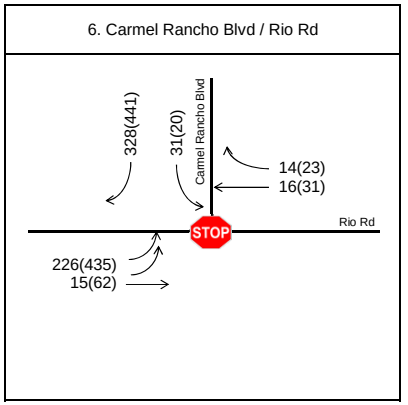


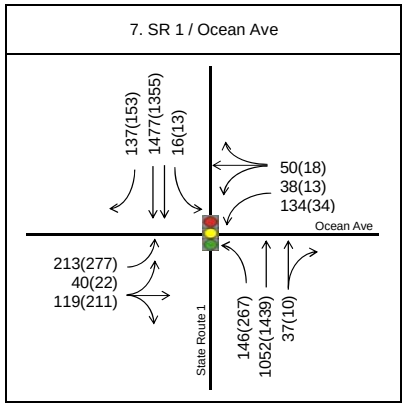


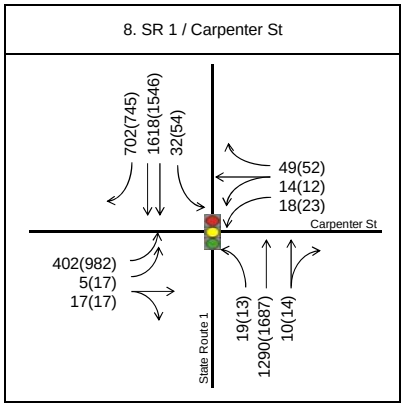


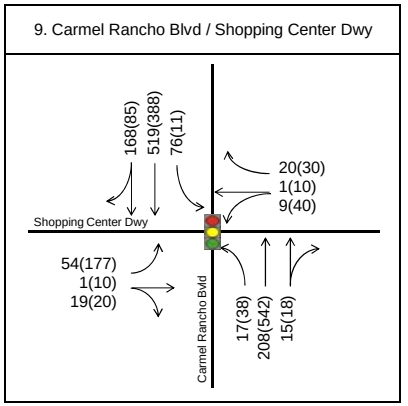










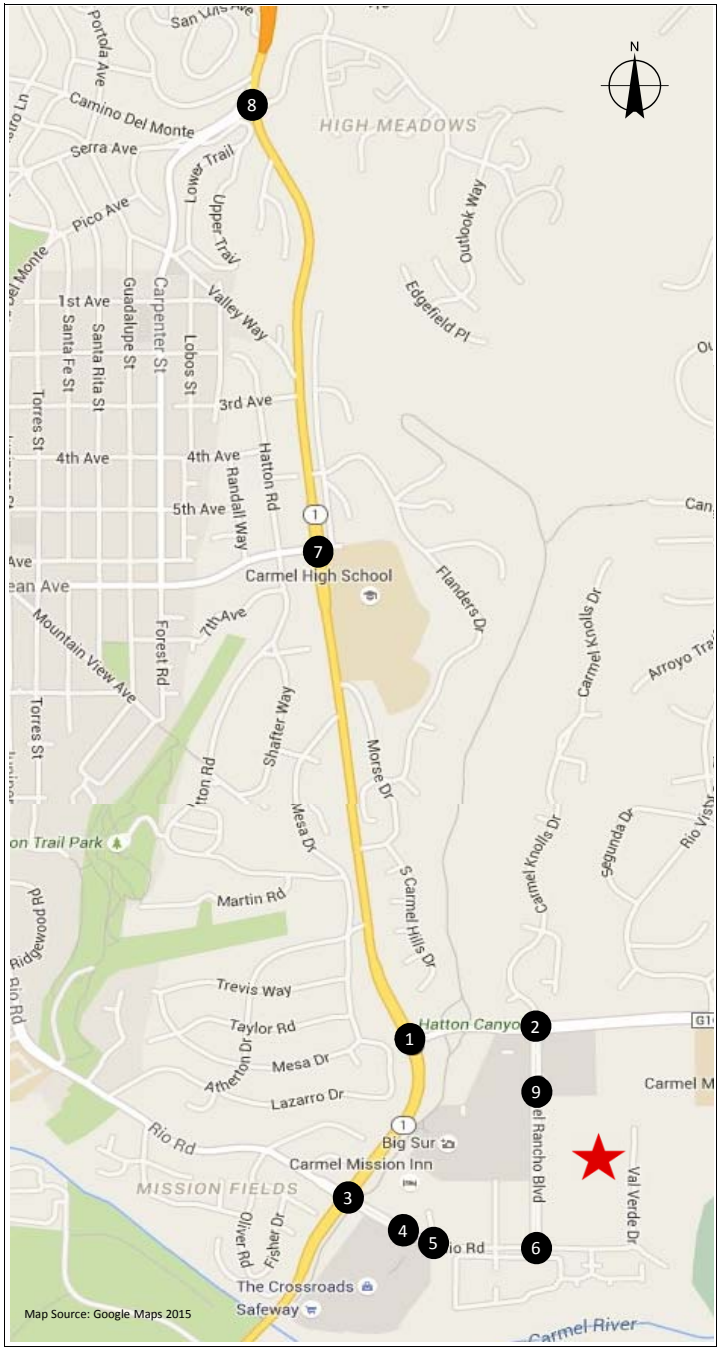


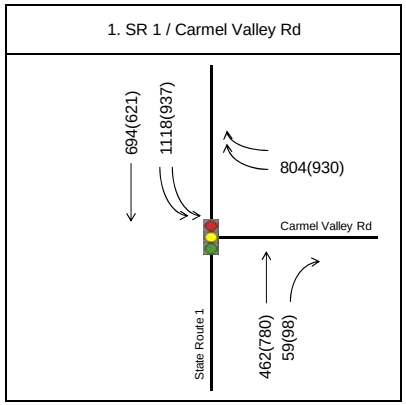
XX(YY) = AM (PM)

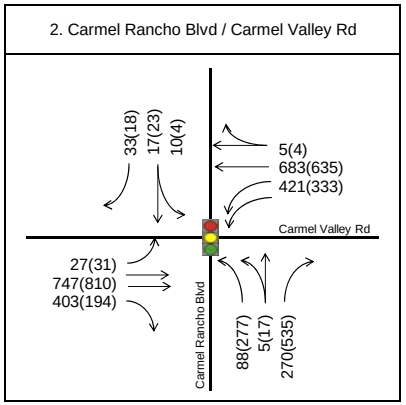
Hatch Mott MacDonald

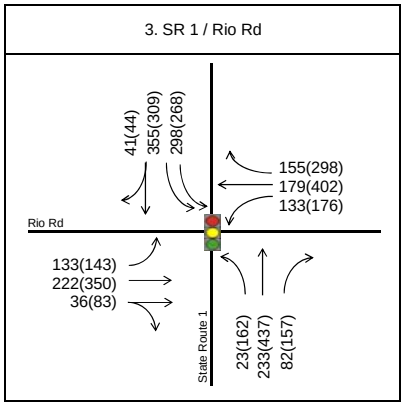
\\Gil-data-vm\fileserver\2015\Jobs\358717 - Carmel Rio Subdivision\Exhibits\10-30-15 Final Draft Report\358717 Volumes_rev1.xls

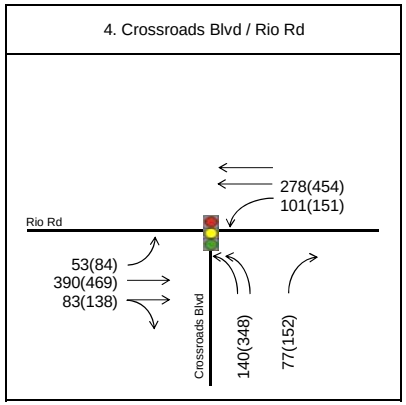
Exhibit 12
Background Conditions
AM & PM Peak Hour Volumes

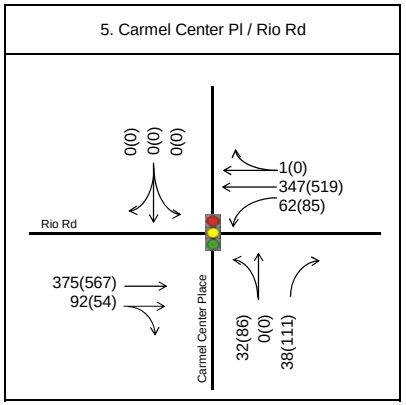


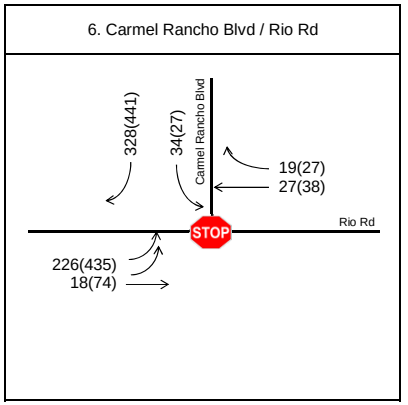


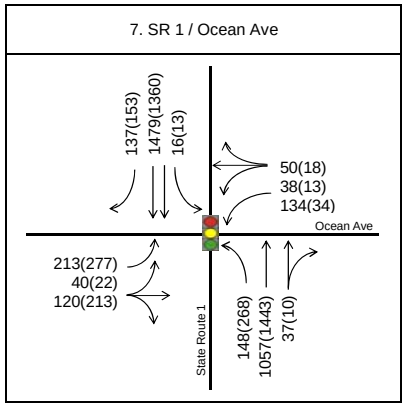


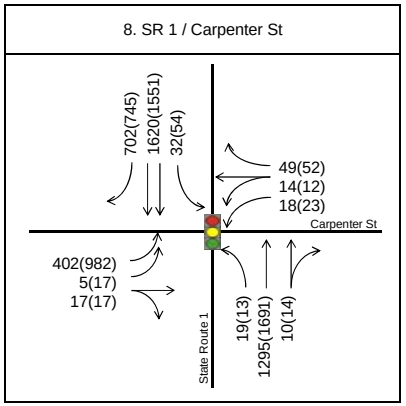


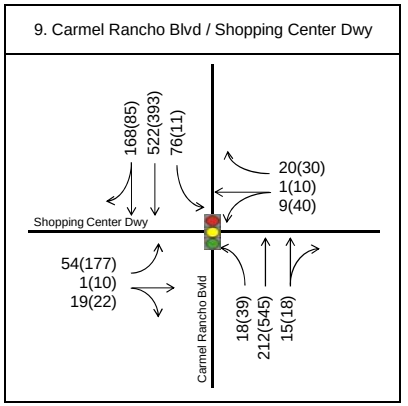












XX(YY) = AM (PM)

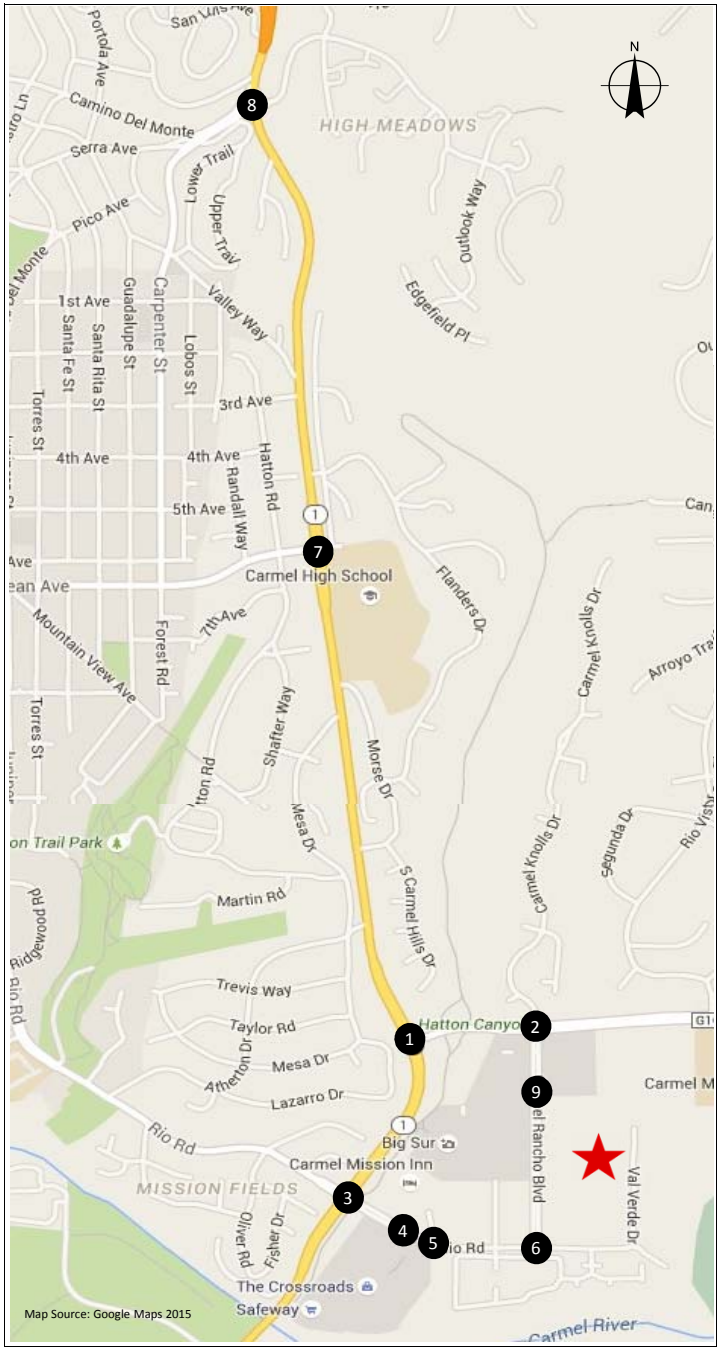
Hatch Mott MacDonald

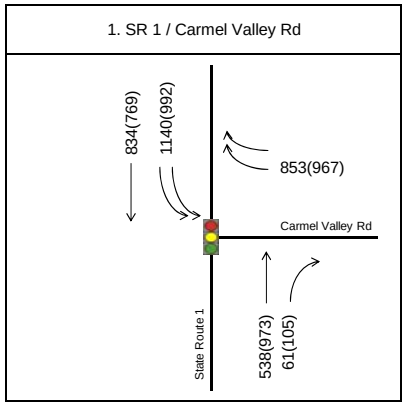
\\Gil-data-vm\fileserver\2015\Jobs\358717 - Carmel Rio Subdivision\Exhibits\1-29-16 Draft Report\358717 Volumes_rev1.xls

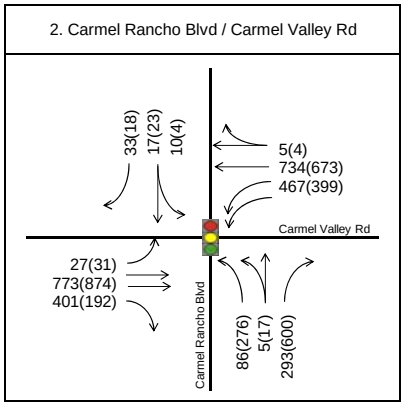
Exhibit 13

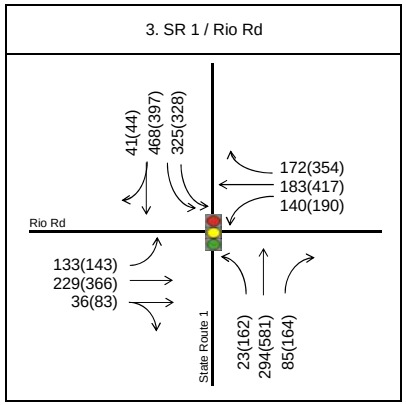
Background Plus Proposed Project Conditions

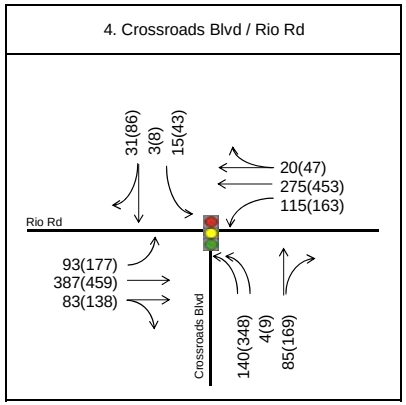
AM & PM Peak Hour Volumes

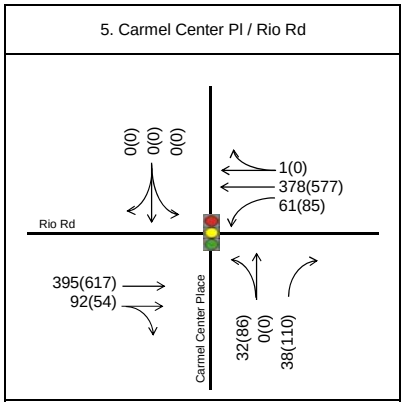


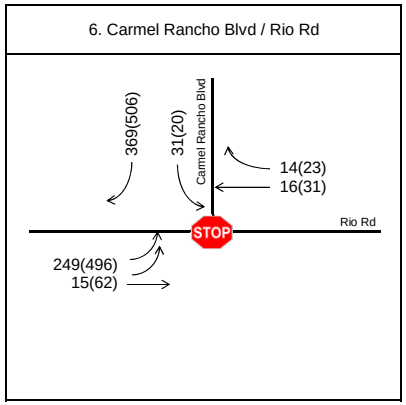


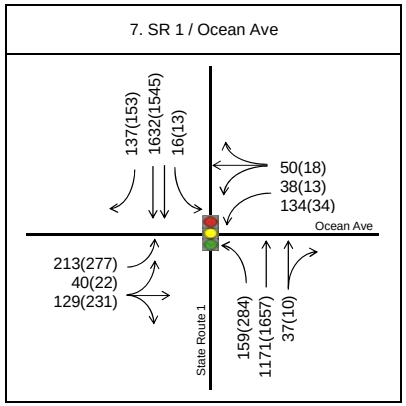


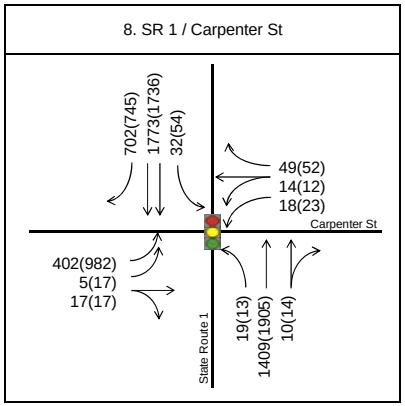


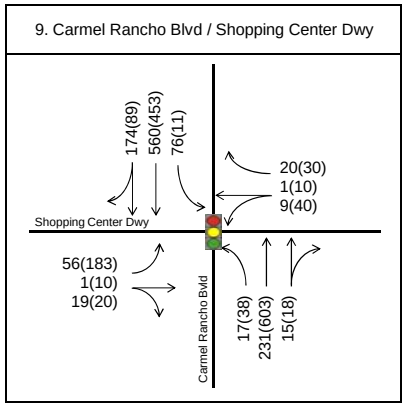


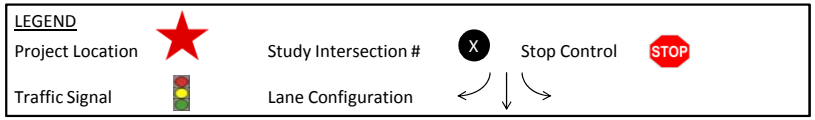










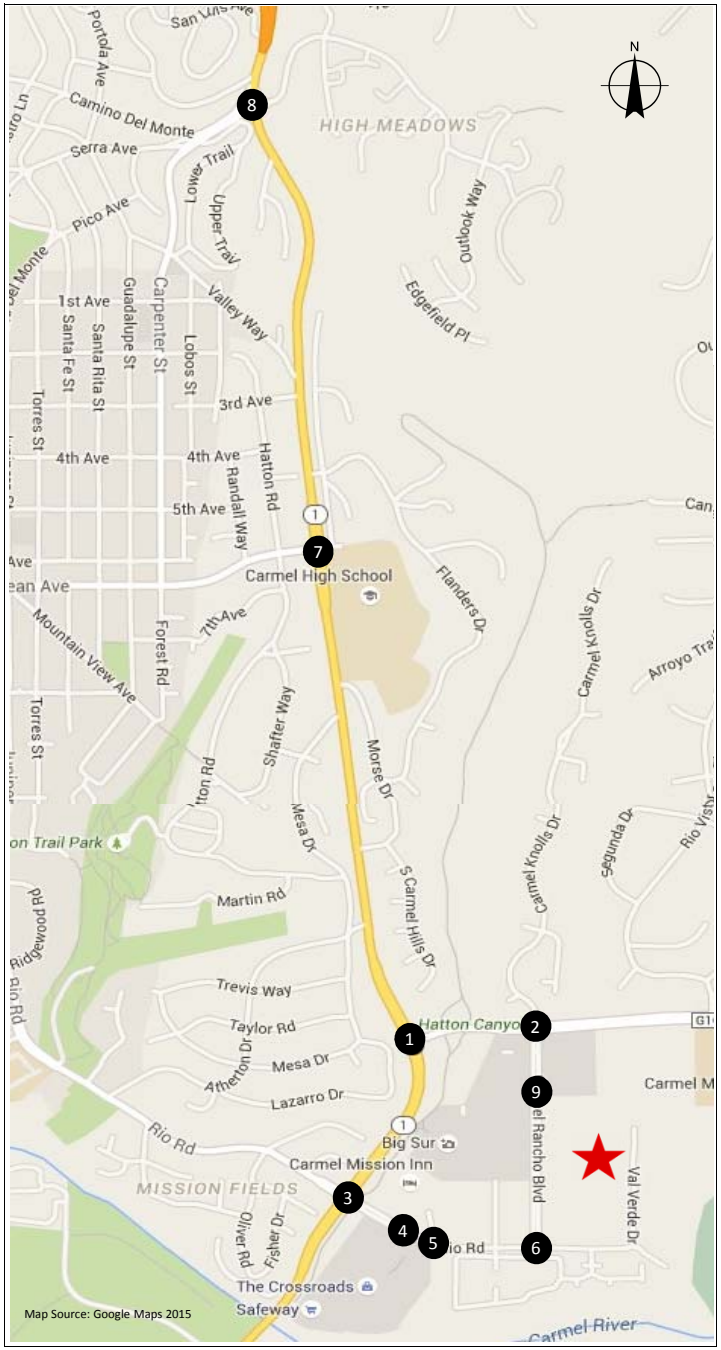


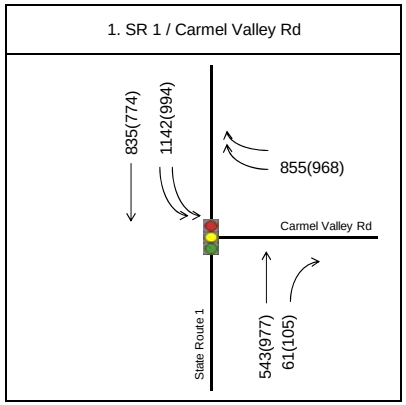
XX(YY) = AM (PM)

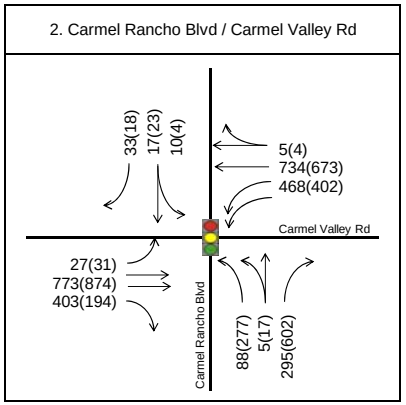
Hatch Mott MacDonald

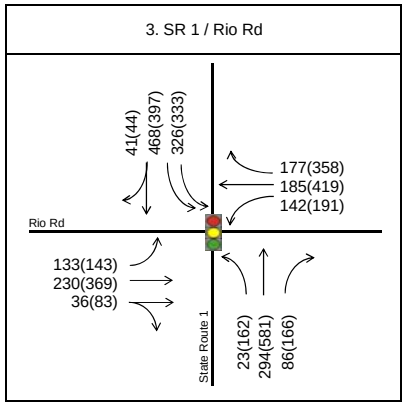
\\Gil-data-vm\fileserver\2015\Jobs\358717 - Carmel Rio Subdivision\Exhibits\10-30-15 Final Draft Report\358717 Volumes_rev1.xls

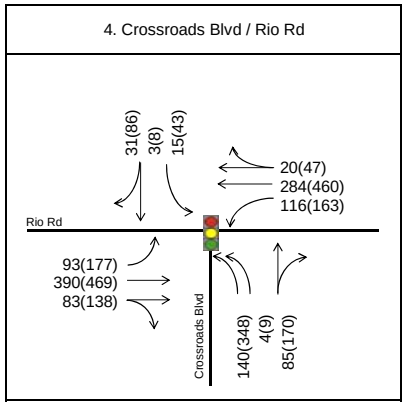
Exhibit 14
Cumulative Conditions
AM & PM Peak Hour Volumes

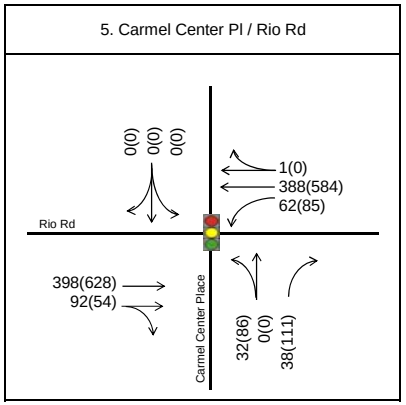


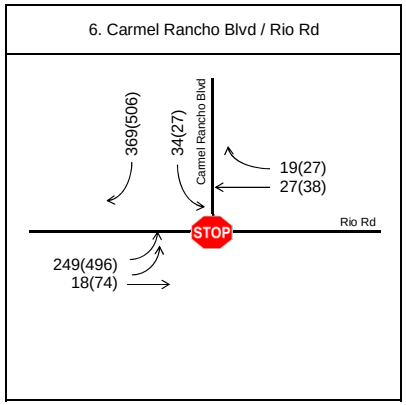


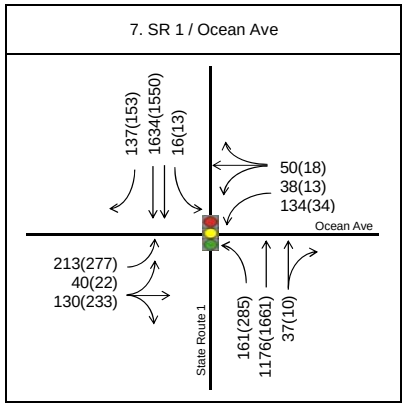


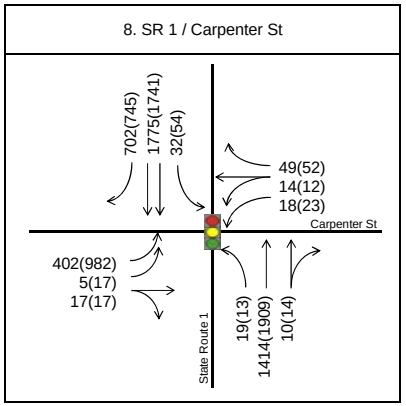


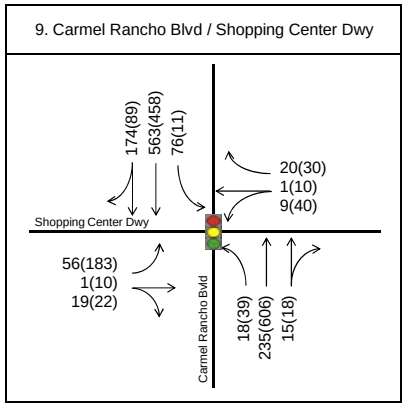












XX(YY) = AM (PM)

Hatch Mott MacDonald

\\Gil-data-vm\fileserver\2015\Jobs\358717 - Carmel Rio Subdivision\Exhibits\1-29-16 Draft Report\358717 Volumes_rev1.xls

Exhibit 15

Cumulative Plus Proposed Project Conditions

AM & PM Peak Hour Volumes

Project Alternative 1 Trip Generation

TRIP GENERATION RATES[1]	LAND USE CODE	DAILY TRIP RATE	AM PEAK HOUR PEAK HOUR RATE	AM PEAK HOUR % OF ADT	AM PEAK HOUR % IN	AM PEAK HOUR % OUT	PM PEAK HOUR PEAK HOUR RATE	PM PEAK HOUR % OF ADT	PM PEAK HOUR % IN	PM PEAK HOUR % OUT
Assisted Living (per bed)	254	2.74	0.18	7%	68%	32%	0.29	11%	50%	50%
Single-Family Detached Housing (per DU)	210	9.52	0.75	8%	25%	75%	1.00	11%	63%	37%

PROPOSED USE	PROJECT SIZE	DAILY TRIPS	AM PEAK HOUR PEAK HOUR TRIPS	AM PEAK HOUR % OF ADT	AM PEAK HOUR TRIPS IN	AM PEAK HOUR TRIPS OUT	PM PEAK HOUR PEAK HOUR TRIPS	PM PEAK HOUR % OF ADT	PM PEAK HOUR TRIPS IN	PM PEAK HOUR TRIPS OUT
Assisted Living	200 Beds	548	36	7%	24	12	58	11%	29	29
Gross Trips Generated		548	36		24	12	58		29	29

CREDIT FOR EXISTING USE	PROJECT SIZE	DAILY TRIPS	AM PEAK HOUR PEAK HOUR TRIPS	AM PEAK HOUR % OF ADT	AM PEAK HOUR TRIPS IN	AM PEAK HOUR TRIPS OUT	PM PEAK HOUR PEAK HOUR TRIPS	PM PEAK HOUR % OF ADT	PM PEAK HOUR TRIPS IN	PM PEAK HOUR TRIPS OUT
Single-Family Detached Housing	-1 DU	-10	-1	10%	0	-1	-1	10%	-1	0
Trips Generated Per ITE Rates		**538**	**35**		**24**	**11**	**57**		**28**	**29**
Trips Generated with Adjusted Employee Shifts[2]			**4**		**2**	**2**	**10**		**5**	**5**

Project Alternative 2 Trip Generation

TRIP GENERATION RATES[1]	LAND USE CODE	DAILY TRIP RATE	AM PEAK HOUR PEAK HOUR RATE	AM PEAK HOUR % OF ADT	AM PEAK HOUR % IN	AM PEAK HOUR % OUT	PM PEAK HOUR PEAK HOUR RATE	PM PEAK HOUR % OF ADT	PM PEAK HOUR % IN	PM PEAK HOUR % OUT
Assisted Living (per bed)	254	2.74	0.18	7%	68%	32%	0.29	11%	50%	50%
Single-Family Detached Housing (per DU)	210	9.52	0.75	8%	25%	75%	1.00	11%	63%	37%

PROPOSED USE	PROJECT SIZE	DAILY TRIPS	AM PEAK HOUR PEAK HOUR TRIPS	AM PEAK HOUR % OF ADT	AM PEAK HOUR TRIPS IN	AM PEAK HOUR TRIPS OUT	PM PEAK HOUR PEAK HOUR TRIPS	PM PEAK HOUR % OF ADT	PM PEAK HOUR TRIPS IN	PM PEAK HOUR TRIPS OUT
Assisted Living	150 Beds	411	27	7%	18	9	44	11%	22	22
Gross Trips Generated		411	27		18	9	44		22	22

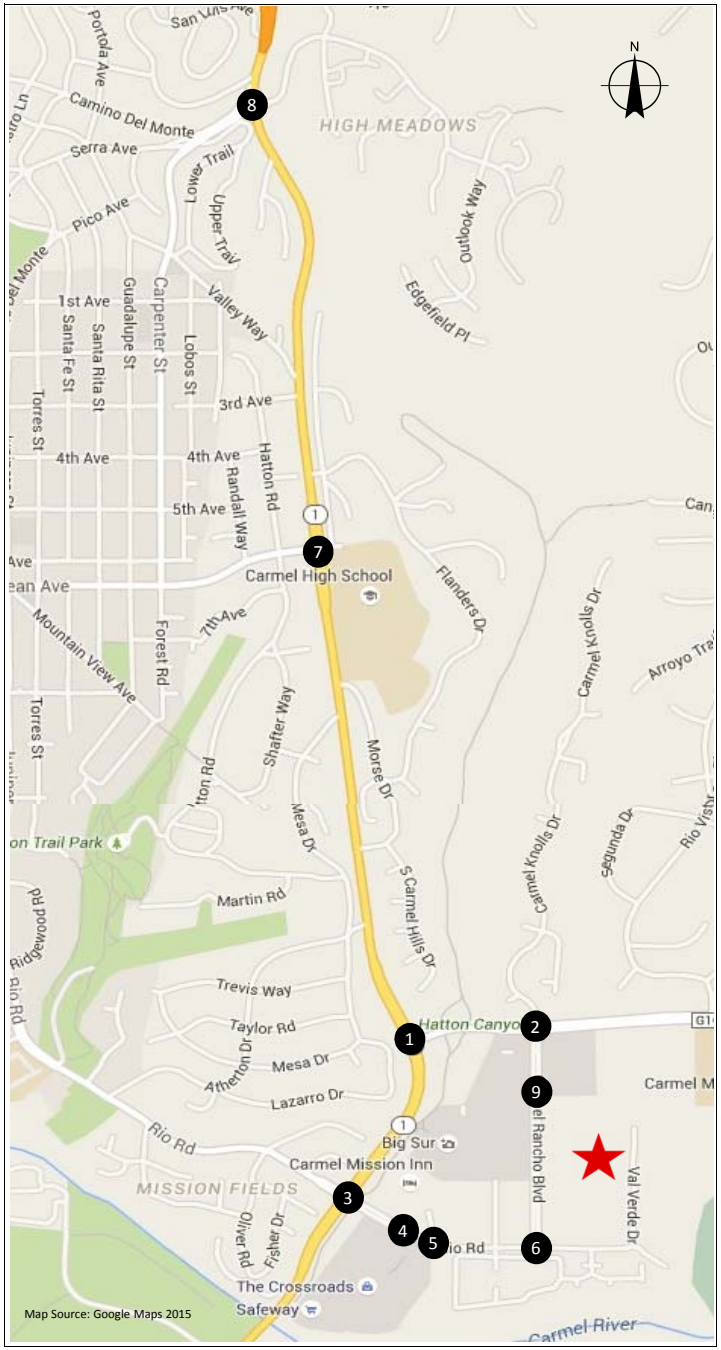
CREDIT FOR EXISTING USE	PROJECT SIZE	DAILY TRIPS	AM PEAK HOUR PEAK HOUR TRIPS	AM PEAK HOUR % OF ADT	AM PEAK HOUR TRIPS IN	AM PEAK HOUR TRIPS OUT	PM PEAK HOUR PEAK HOUR TRIPS	PM PEAK HOUR % OF ADT	PM PEAK HOUR TRIPS IN	PM PEAK HOUR TRIPS OUT
Single-Family Detached Housing	-1 DU	-10	-1	10%	0	-1	-1	10%	-1	0
Trips Generated Per ITE Rates		**401**	**26**		**18**	**8**	**43**		**21**	**22**
Trips Generated with Adjusted Employee Shifts[2]			**3**		**2**	**1**	**8**		**4**	**4**

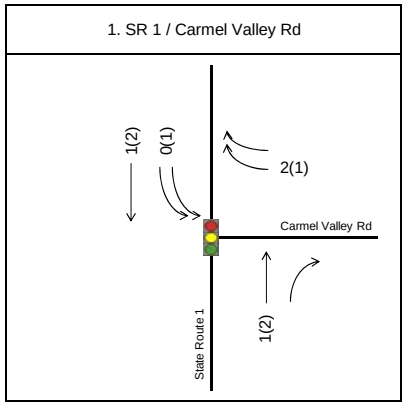
Notes:
1. Trip generation rates based on Institute of Transportation Engineers (ITE) "Trip Generation Manual," 9th Edition, 2012.
2. Assumes all employees are scheduled to arrive and leave outside the AM and PM peak hours.
   Includes anticipated incidental delivery and/or visitor trips during the peak hours.

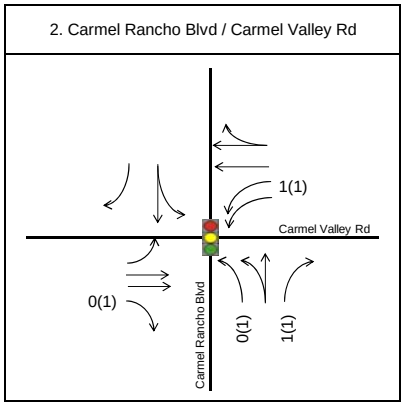
Hatch Mott MacDonald

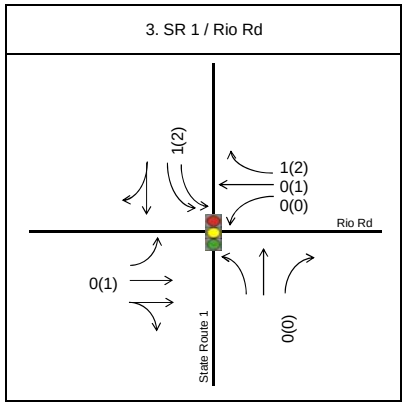
\\Gil-data-vm\fileserver\2015\Jobs\358717 - Carmel Rio Subdivision\Exhibits\3-x-16 Draft Report\358717 Alt Trip Gen.xlsx

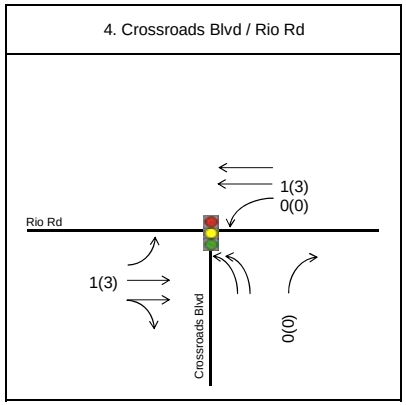
Exhibit 16
Project Alternatives 1 and 2
Trip Generation Estimates

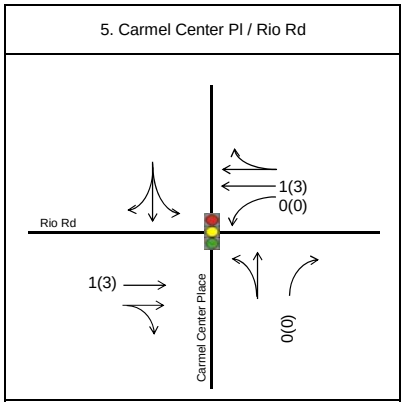


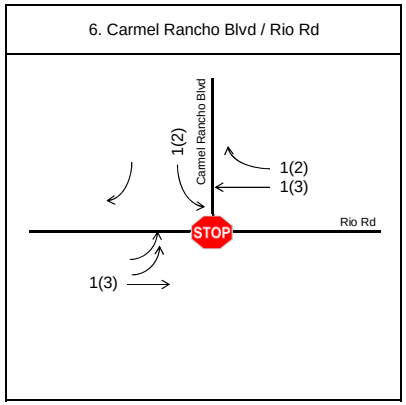


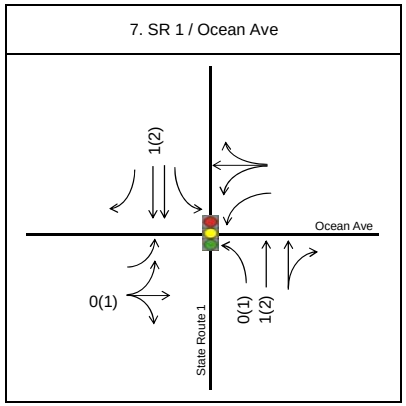


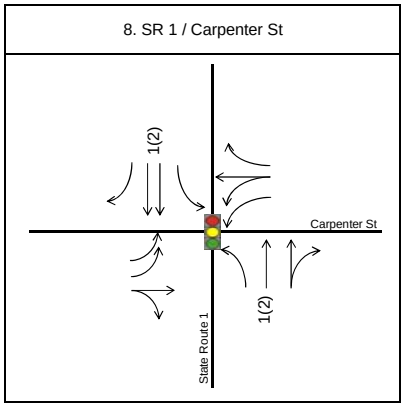


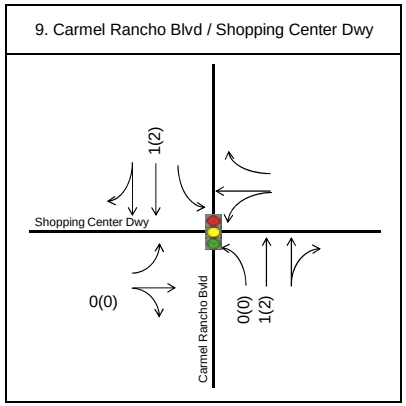












XX (YY) = AM (PM)

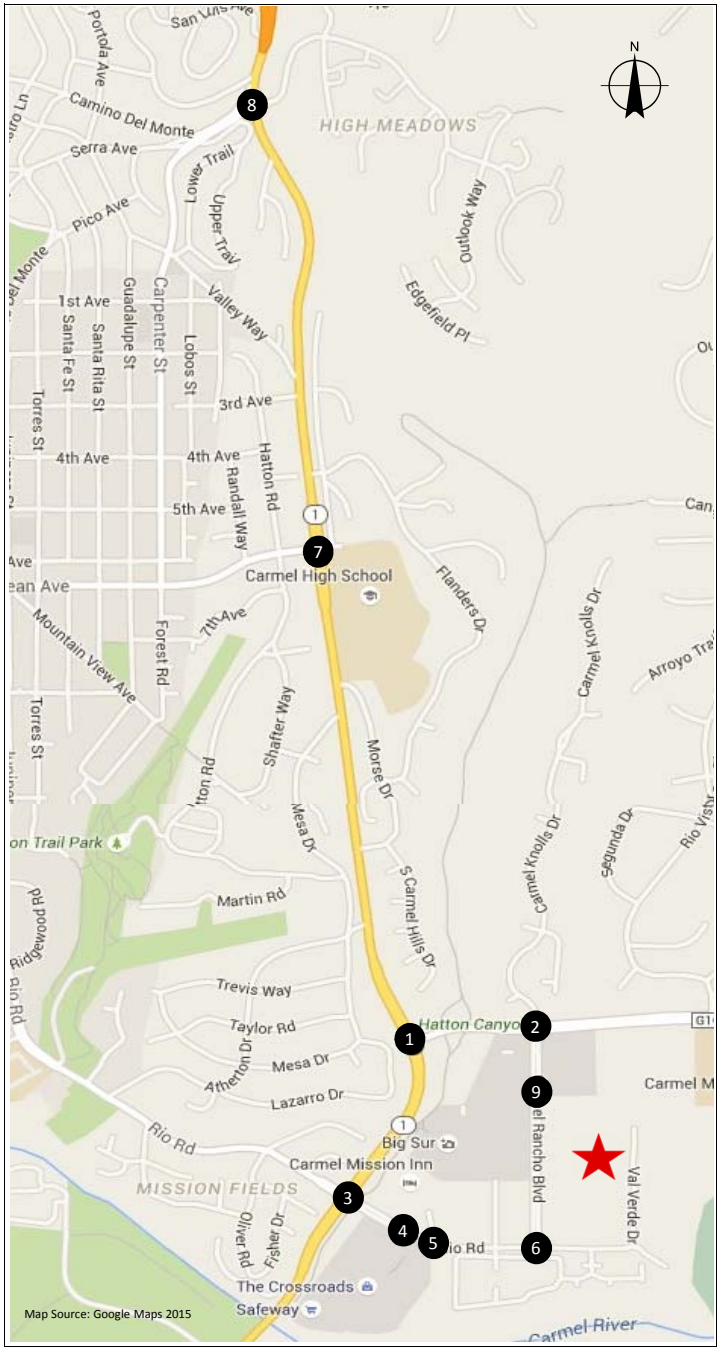
Hatch Mott MacDonald

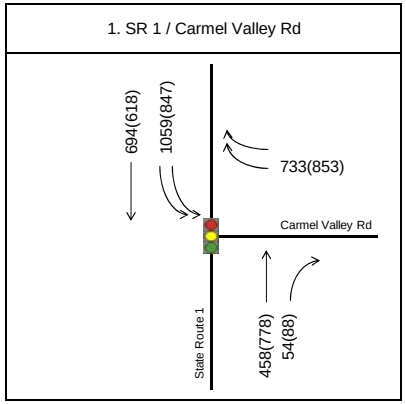
\\Gil-data-vm\fileserver\2015\Jobs\358717 - Carmel Rio Subdivision\Exhibits\3-x-16 Draft Report\358717 Alt 1 Project Volumes.xls

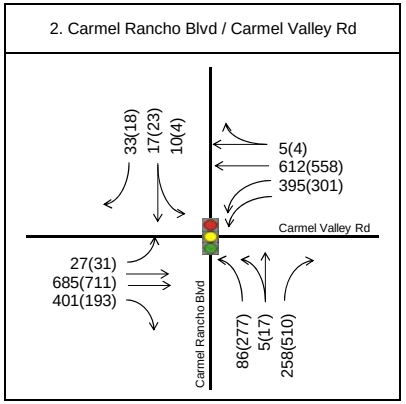
Exhibit 17

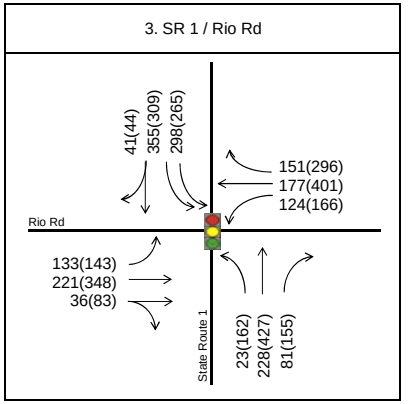
Project Alternative 1 Trip Assignment

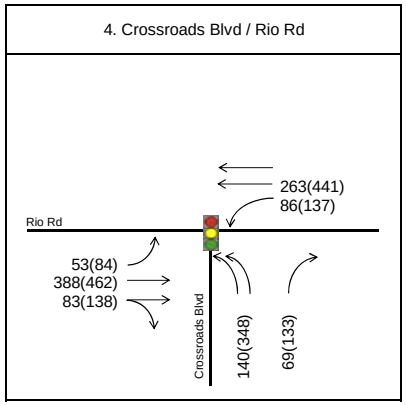
AM & PM Peak Hour Volumes

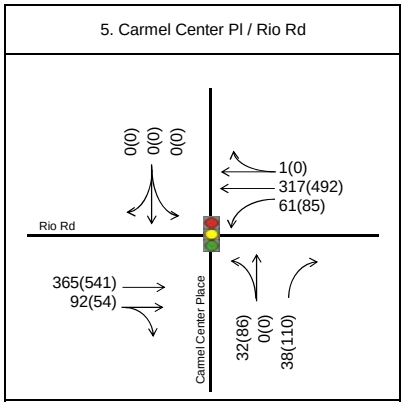


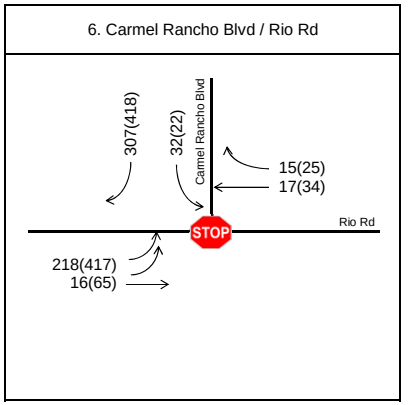


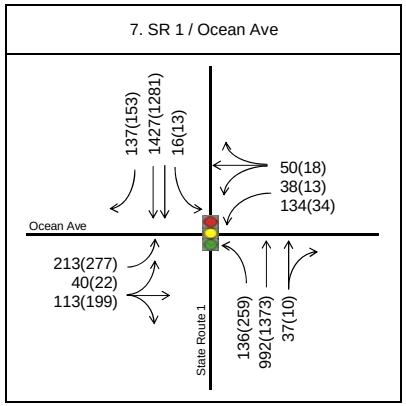


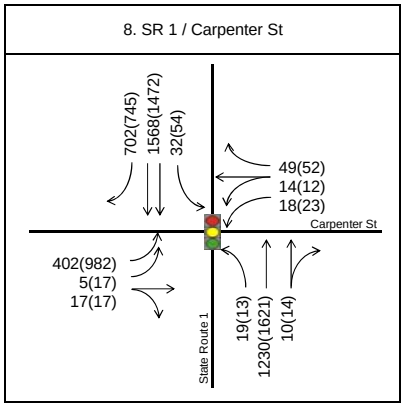


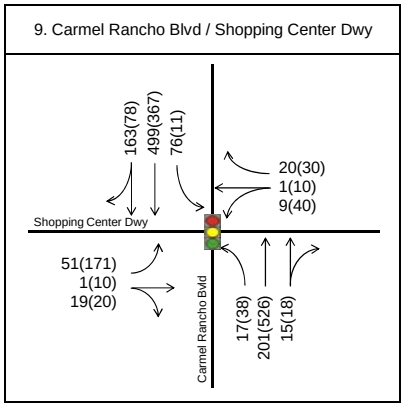












XX (YY) = AM (PM)

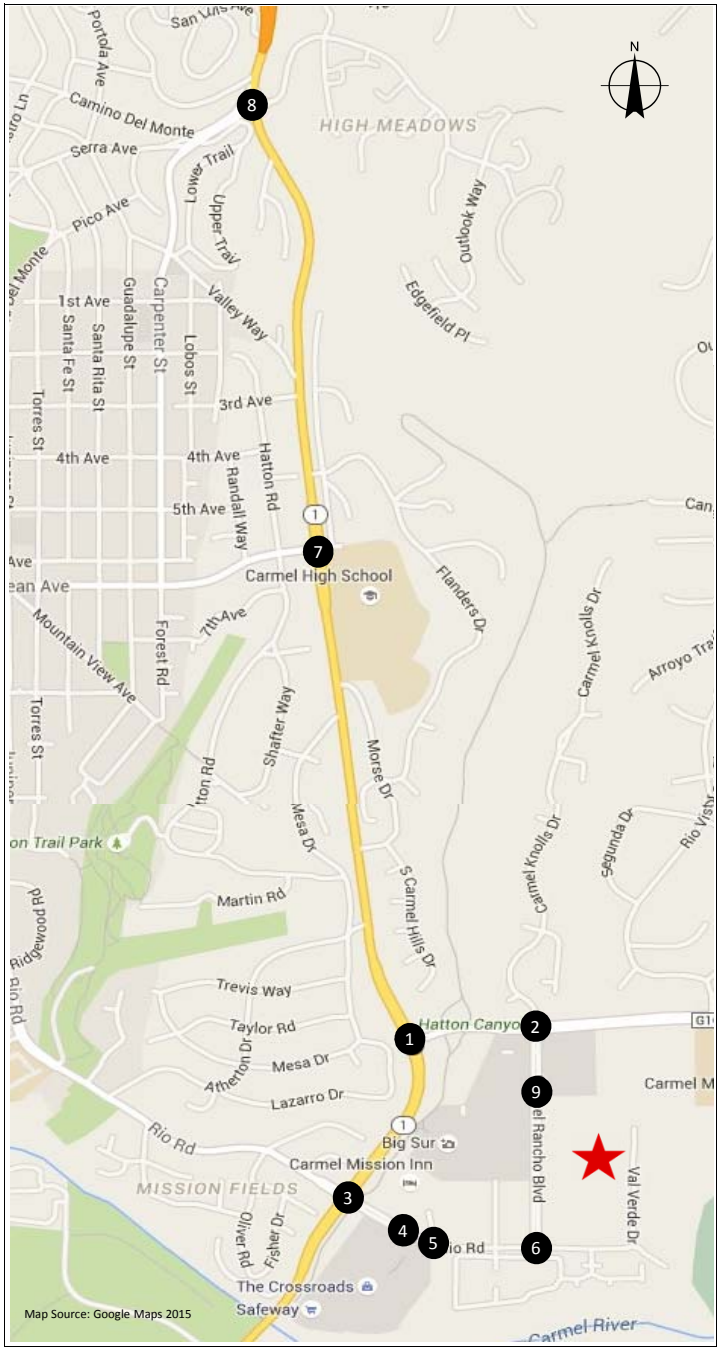
Hatch Mott MacDonald

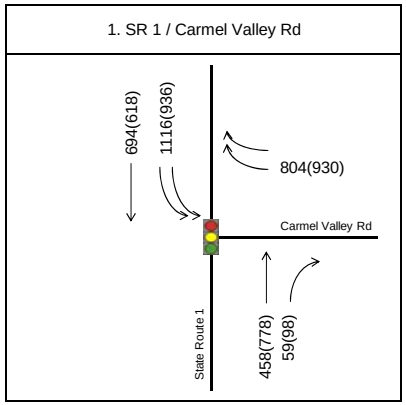
\\Gil-data-vm\fileserver\2015\Jobs\358717 - Carmel Rio Subdivision\Exhibits\3-x-16 Draft Report\358717 Alt 1 Project Volumes.xls

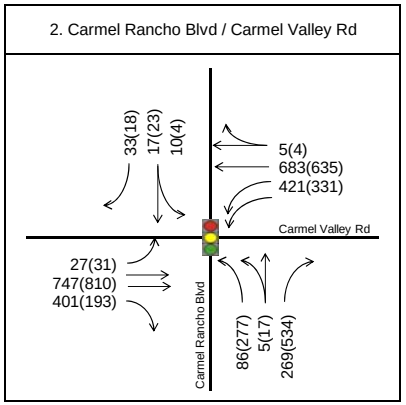
Exhibit 18

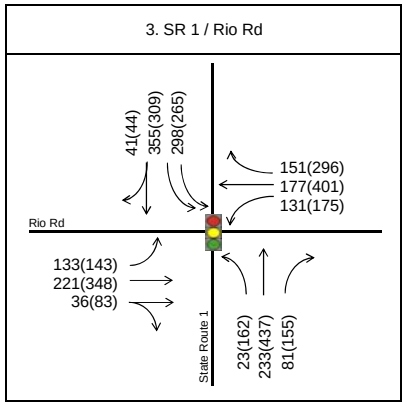
Existing Plus Project Alternative 1 Conditions

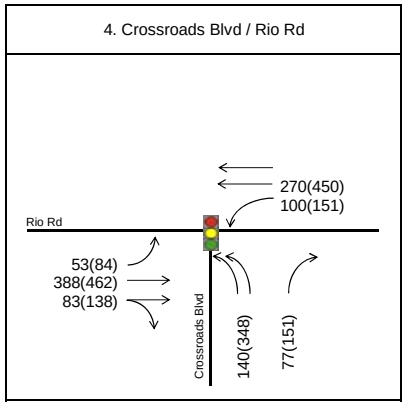
AM & PM Peak Hour Volumes

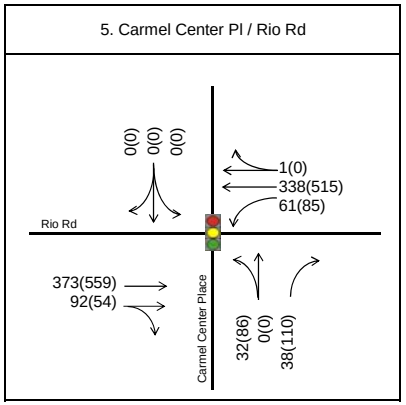


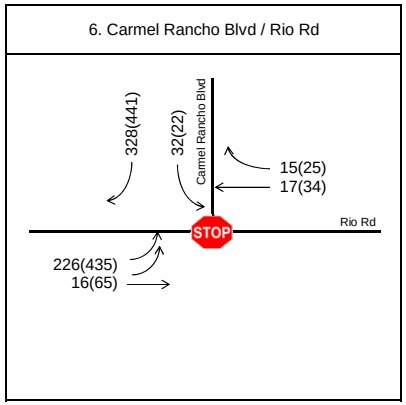


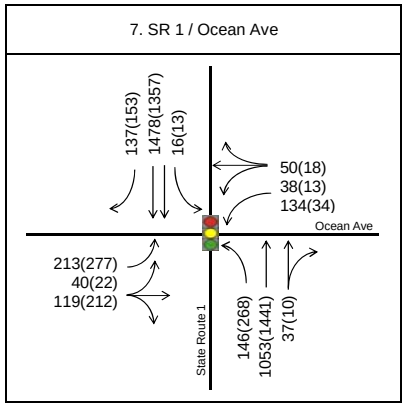


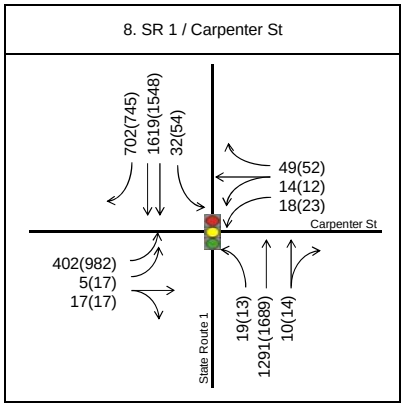


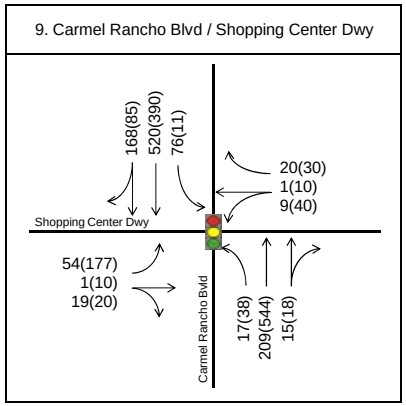












XX(YY) = AM (PM)

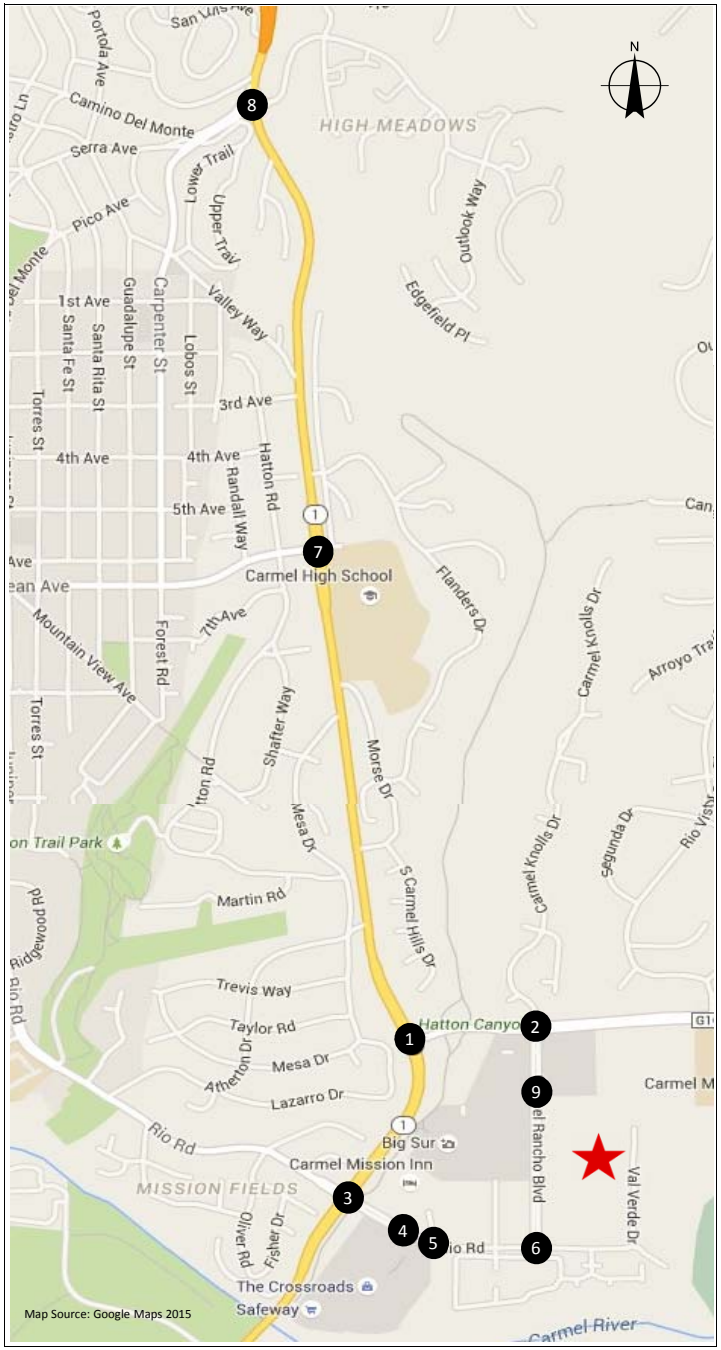
Hatch Mott MacDonald

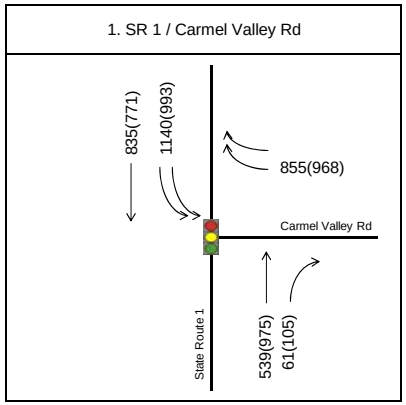
\\Gil-data-vm\fileserver\2015\Jobs\358717 - Carmel Rio Subdivision\Exhibits\3-x-16 Draft Report\358717 Alt 1 Project Volumes.xls

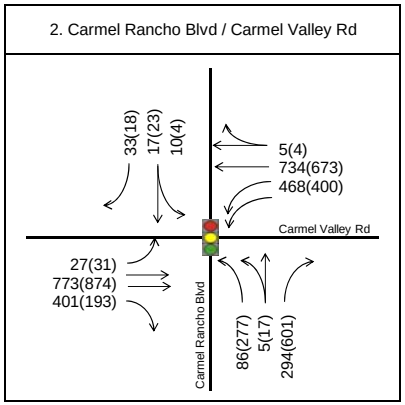
Exhibit 19

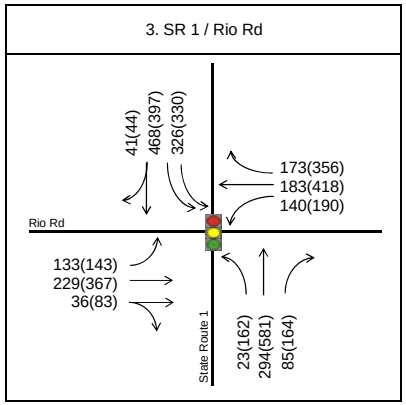
Background Plus Project Alternative 1 Conditions

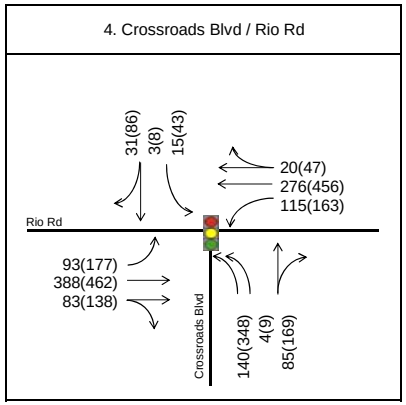
AM & PM Peak Hour Volumes

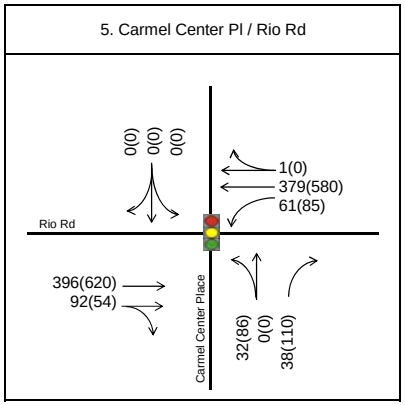


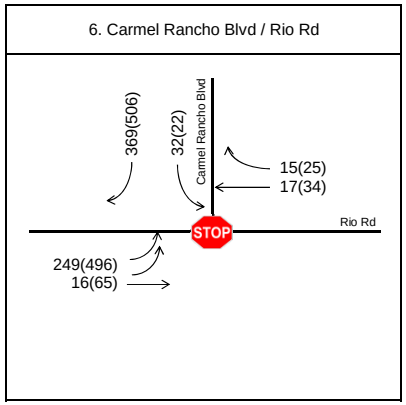


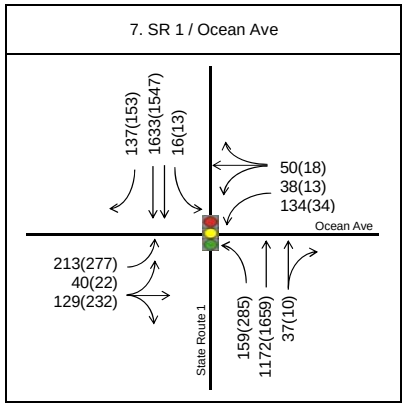


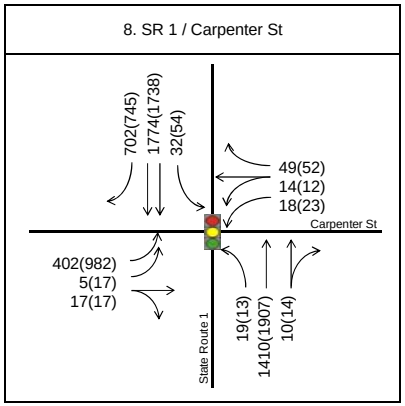


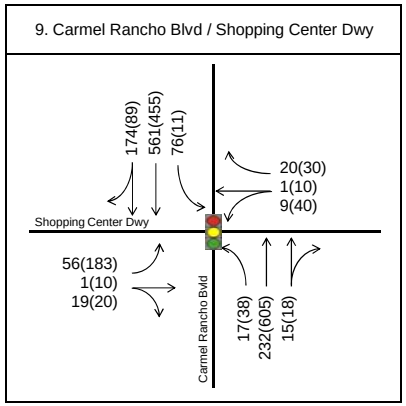


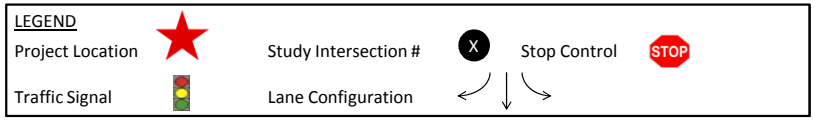












XX(YY) = AM (PM)

Hatch Mott MacDonald

\\Gil-data-vm\fileserver\2015\Jobs\358717 - Carmel Rio Subdivision\Exhibits\3-x-16 Draft Report\358717 Alt 1 Project Volumes.xls

Exhibit 20

Cumulative Plus Project Alternative 1 Conditions

AM & PM Peak Hour Volumes

	N-S Street	E-W Street	Existing Lane Configuration[1, 2]	Existing Intersection Control	LOS Standard Jurisdiction	Existing Conditions				Existing Plus Project Alt 1 Conditions				Background Conditions				Background Plus Project Alt 1 Conditions				Cumulative Conditions				Cumulative Plus Project Alt 1 Conditions			
						AM Pk Hr.		PM Pk Hr.		AM Pk Hr.		PM Pk Hr.		AM Pk Hr.		PM Pk Hr.		AM Pk Hr.		PM Pk Hr.		AM Pk Hr.		PM Pk Hr.		AM Pk Hr.		PM Pk Hr.	
						Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
1	SR 1	Carmel Valley Road	NB 1-T, 1-R SB 2-L, 1-T WB 2-R *With RTP Improvements*	Signal	C/D Caltrans	11.3	B	18.1	B	11.3	B	18.1	B	11.9	B	21.0	C	11.9	B	21.1	C	14.1	B	43.5	D	14.1 *9.5*	B *A*	43.8 *18.3*	D *B*
2	Carmel Rancho Blvd	Carmel Valley Road	NB 1-L, 1-L/T, 1-R SB 1-L/T, 1-R EB 1-L, 2-T, 1-R WB 2-L, 1-T, 1-T/R	Signal	C CVMP	16.9	B	19.3	B	16.9	B	19.3	B	18.4	B	20.2	C	18.4	B	20.2	C	22.0	C	22.6	C	22.1	C	22.6	C
3	SR 1	Rio Road	NB 1-L, 1-T, 1-R SB 2-L, 1-T/R EB 1-L, 1-T, 1-T/R WB 1-L, 1-T, 1-R *With RTP Improvements*	Signal	C/D Caltrans	22.6	C	37.9	D	22.6	C	37.9	D	22.8	C	38.6	D	22.8	C	38.6	D	26.7	C	54.0	D	26.7 *24.1*	C *C*	54.2 *40.7*	D *D*
4	Crossroads Blvd	Rio Road	NB 2-L, 1-T/R EB 1-L, 1-T, 1-T/R WB 1-L, 2-T	Signal	C CVMP	9.9	A	12.0	B	9.9	A	12.0	B	10.2	B	12.5	B	10.2	B	12.5	B	20.2	C	32.9	C	20.1	C	32.8	C
5	Carmel Center Place	Rio Road	NB 1-L/T, 1-R SB 1-L/T/R EB 1-T, 1-T/R WB 1-L, 1-T, 1-T/R	Signal	C CVMP	9.3	A	6.0	A	9.3	A	6.0	A	9.1	A	5.9	A	9.1	A	5.9	A	6.1	A	7.8	A	6.0	A	7.8	A
6	Carmel Rancho Blvd	Rio Road	SB 1-L, 1-R EB 2-L, 1-T WB 1-T, 1-R	Two-Way Stop SB EB WB	C CVMP	10.2 7.7 15.2	B A C	10.7 8.1 19.8	B A C	10.2 7.7 15.3	B A C	10.7 8.1 19.8	B A C	10.4 7.8 15.9	B A C	10.9 8.1 20.8	B A C	10.4 7.8 16.0	B A C	10.9 8.1 20.7	B A C	10.9 7.8 17.7	B A C	11.7 8.3 23.5	B A C	10.9 7.8 17.7	B A C	11.7 8.3 23.2	B A C
7	SR 1	Ocean Avenue	NB 1-L, 1-T, 1-T/R SB 1-L, 2-T, 1-R EB 1-L, 1-L/T/R WB 1-L, 1-L/T/R	Signal	C/D Caltrans	43.6	D	37.1	D	**43.7**	**D**	**37.3**	**D**	49.8	D	43.1	D	**49.9**	**D**	**43.4**	**D**	71.4	E	67.5	E	**71.5**	**E**	**67.9**	**E**
8	SR 1	Carpenter Street	NB 1-L, 1-T, 1-T/R SB 1-L, 2-T, 1-R EB 2-L, 1-T/R WB 1-L, 1-L/T, 1-R *With NB RT Lane*	Signal	C/D Caltrans	23.8	C	47.1	D	23.8 *23.7*	C *C*	47.3 *46.1*	D *D*	25.0	C	52.4	D	25.1 *24.9*	C *C*	52.6 *50.0*	D *D*	32.3	C	77.2	E	32.4 *30.3*	C *C*	77.5 *67.6*	E *E*
9	Carmel Rancho Blvd	Shopping Center Dwy	NB 1-L, 1-T, 1-T/R SB 1-L, 1-T, 1-T/R EB 1-L, 1-T/R WB 1-L/T, 1-R	Signal	C CVMP	4.0	A	5.5	A	4.0	A	5.6	A	4.0	A	5.6	A	4.0	A	5.6	A	4.0	A	5.8	A	4.0	A	5.8	A

Notes:

1 L, T, R = Left, Through, Right
2 NB, SB, EB, WB = Northbound, Southbound, Eastbound, Westbound
3 Level of service highlighted in red indicates that LOS exceeds the LOS standard.
4 Yellow highlight indicates project impact.
5 Bold type indicates unmitigated impact.

Hatch Mott MacDonald

\\Gil-data-vm\fileserver\2015\Jobs\358717 - Carmel Rio Subdivision\Exhibits\3-x-16 Draft Report\358717 Alt 1 Int LOS.xlsx

Exhibit 21

Project Alternative 1 Scenarios

Intersection Levels of Service

Seg #	Road Segment	Existing AM vs Existing + Project Alt 1 AM				Existing PM vs Existing + Project Alt 1 PM				Background AM vs Background + Project Alt 1 AM				Background PM vs Background + Project Alt 1 PM				Cumulative AM vs Cumulative + Project Alt 1 AM				Cumulative PM vs Cumulative + Project Alt 1 PM			
		Existing AM		Exist+Proj AM		Existing PM		Exis+Proj PM		Background AM		Back+Proj AM		Background PM		Back+Proj PM		Cumulative AM		Cum+Proj AM		Cumulative PM		Cum+Proj PM	
	NB Carmel Rancho Blvd	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	27.3	A	27.3	A	24.9	B	24.9	B	27.3	A	27.3	A	24.8	B	24.8	B	27.2	A	27.2	A	24.6	B	24.7	B
11	From Shopping Center Dwy to Carmel Valley Rd	9.5	D	9.5	D	8.9	E	8.9	E	9.2	D	9.2	D	8.6	E	8.5	E	9.1	D	9.1	D	8.3	E	8.2	E
	Total	17.5	C	17.5	C	16.2	C	16.2	C	17.2	C	17.2	C	15.8	C	15.8	C	17.1	C	17.1	C	15.4	C	15.4	C
	SB Carmel Rancho Blvd	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	18.3	C	18.3	C	16.8	C	16.8	C	18.2	C	18.2	C	16.7	C	16.7	C	18.1	C	18.1	C	16.4	C	16.5	C
12	From Shopping Center Dwy to Rio Rd	22.9	B	22.9	B	22.6	B	22.6	B	22.8	B	22.8	B	22.5	B	22.5	B	22.5	B	22.5	B	22.1	B	22.1	B
	Total	21.3	B	21.3	B	20.5	B	20.5	B	21.2	B	21.2	B	20.4	B	20.4	B	21.0	B	21.0	B	20.0	B	20.1	B
	EB Rio Rd	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	17.3	C	17.3	C	17.3	C	17.3	C	17.3	C	17.3	C	17.3	C	17.3	C	17.1	C	17.1	C	17.0	C	17.0	C
13	From SR 1 to Crossroads Blvd	12.9	D	12.9	D	11.7	D	11.7	D	12.6	D	12.6	D	11.7	D	11.6	D	10.9	D	10.9	D	9.2	D	9.2	D
14	From Crossroads Blvd to Carmel Center Pl	12.2	D	12.2	D	11.0	D	11.0	D	12.1	D	12.1	D	10.9	D	10.9	D	8.9	E	8.9	E	7.8	E	7.8	E
15	From Carmel Center Pl to Carmel Rancho Blvd	16.1	C	16.1	C	17.1	C	17.1	C	16.0	C	16.0	C	17.1	C	17.1	C	16.0	C	16.0	C	17.0	C	17.0	C
	Total	15.8	C	15.8	C	15.7	C	15.7	C	15.8	C	15.8	C	15.6	C	15.6	C	14.9	C	14.9	C	14.3	C	14.3	C
	WB Rio Rd	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	20.3	B	20.3	B	19.6	B	19.6	B	20.3	B	20.3	B	19.6	B	19.6	B	20.2	B	20.3	B	19.6	B	19.6	B
14	From Carmel Center Pl to Crossroads Blvd	9.6	D	9.6	D	8.3	E	8.3	E	9.6	D	9.6	D	8.4	E	8.4	E	6.8*	F	6.8*	F	4.8*	F	4.8*	F
13	From Crossroads Blvd to SR 1	7.3	E	7.3	E	7.2	E	7.2	E	7.3	E	7.3	E	7.2	E	7.2	E	7.2	E	7.2	E	6.9	F	6.9	F
5	From SR 1 to Atherton Dr	19.6	B	23.5	B	23.5	B	23.5	B	23.5	B	23.5	B	23.5	B	23.5	B	23.5	B	23.5	B	23.5	B	23.5	B
	Total	15.1	C	16.3	C	15.9	C	15.9	C	16.3	C	16.3	C	15.9	C	15.9	C	15.6	C	15.6	C	14.6	C	14.6	C
	NB SR 1	Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS	
1	From Ocean Ave to Carpenter St	C		C		D		D		C		C		D		D		C		C		D		D	
2	From Carmel Valley Rd to Ocean Ave	C		C		C		C		F		F		C		C		F		F		C		C	
3	From Rio Rd to Carmel Valley Rd	F		F		F		F		F		F		F		F		F		F		F		F	
4	From Ribera Rd to Rio Rd	B		B		B		B		B		B		B		B		B		B		B		B	
	SB SR 1	Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS	
1	From Carpenter St to Ocean Ave	D		D		C		C		D		D		C		C		D		D		C		C	
2	From Ocean Ave to Carmel Valley Rd	C		C		C		C		C		C		C		C		C		C		C		C	
3	From Carmel Valley Rd to Rio Rd	C		C		E		E		C		C		E		E		C		C		E		E	
4	From Rio Rd to Ribera Rd	B		B		B		B		B		B		B		B		B		B		B		B	

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.
2. Text highlighted in yellow indicates potential project impact.
3. * = Traffic flow on this segment is controlled by closely spaced intersections that operate acceptably. Therefore, project does not have an impact.
4. SR 1 road segment levels of service are referenced from the *Rancho Cañada Draft Transportation Impact Study Report* prepared by Central Coast Transportation Consulting (CCTC, January 2015)

Hatch Mott MacDonald

\\Gil-data-vm\fileserver\2015\Jobs\358717 - Carmel Rio Subdivision\Exhibits\5-26-16 Draft Report\358717 Alt 1 Arterial LOS_rev1.xlsx

Exhibit 22

Project Alternative 1 Scenarios

Arterial Level of Service Summary

Carmel Valley Road				Existing Conditions	Existing Plus Project Alt 1 Conditions	Background Conditions	Background + Project Alt 1 Conditions	Cumulative Conditions	Cumulative + Project Alt 1 Conditions
Segment	From	To	CVMP ADT Threshold	ADT	ADT	ADT	ADT	ADT	ADT
6	Robinson Canyon Rd	Schulte Rd	15,499	14,611	14,692	15,847	**15,928**	17,107	**17,188**
7	Schulte Rd	Rancho San Carlos Rd	16,340	15,974	16,055	17,865	**17,946**	19,125	**19,206**
8	Rancho San Carlos Rd	Rio Rd	48,487	18,982	19,063	21,046	21,127	22,706	22,787
9	Rio Rd	Carmel Rancho Blvd	51,401	24,228	24,309	26,319	26,400	28,699	28,780
10	Carmel Rancho Blvd	SR 1	27,839	22,006	22,243	23,606	23,843	24,626	24,863

Notes:

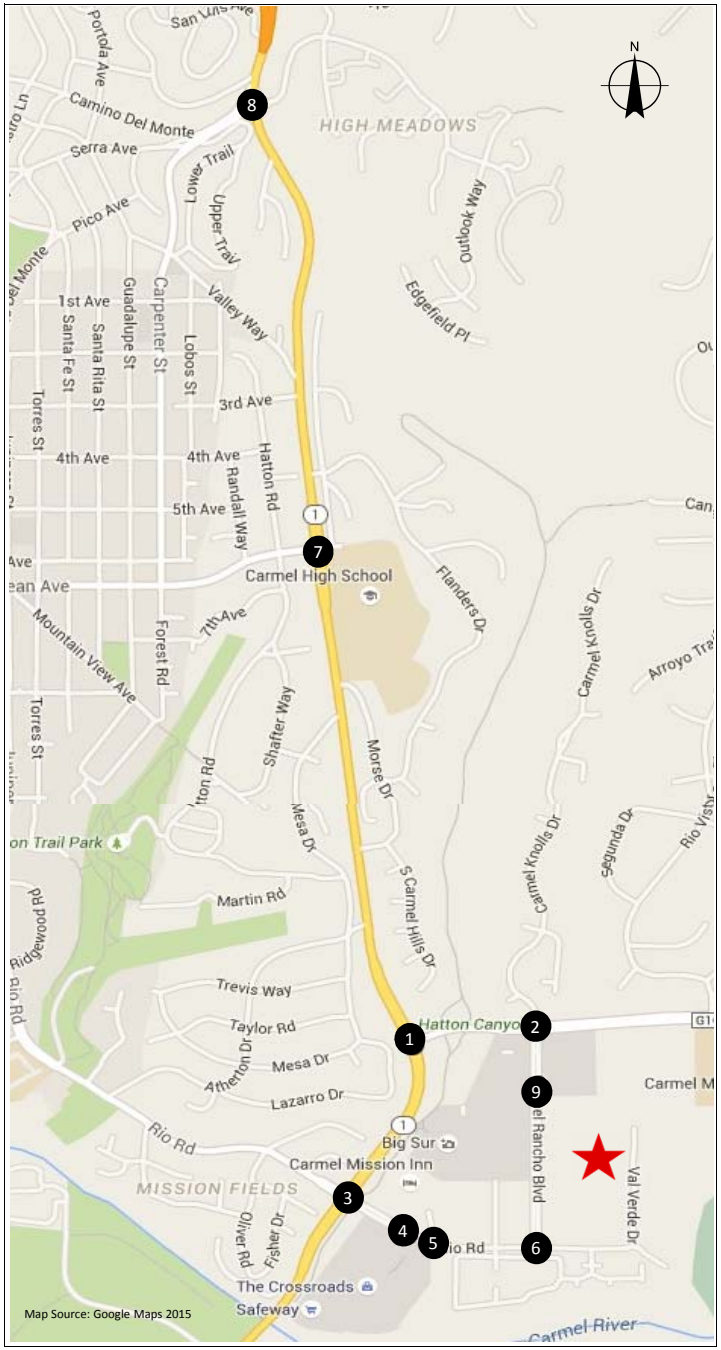
1. ADT highlighted in red indicates ADT exceeds ADT threshold.
2. ADT highlighted in yellow indicates ADT exceeds Carmel Valley Master Plan (CVMP) ADT Threshold and is a project impact.
3. Bold type indicates unmitigated impact.

Exhibit 23

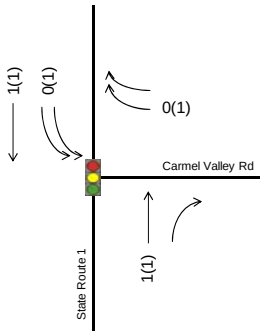
Project Alternative 1 Scenarios

Road Segment ADT's

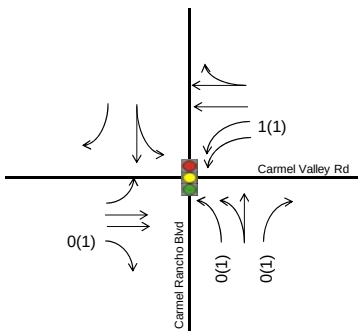
Segments 6 - 10



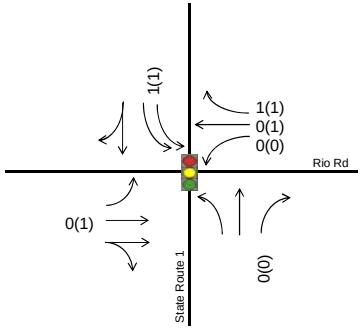
1. SR 1 / Carmel Valley Rd



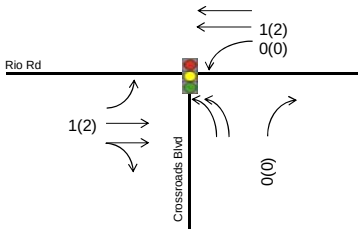
2. Carmel Rancho Blvd / Carmel Valley Rd



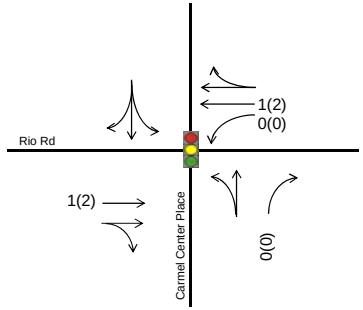
3. SR 1 / Rio Rd



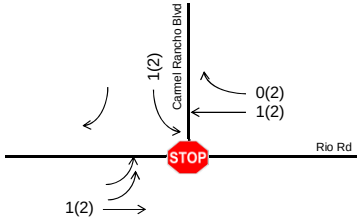
4. Crossroads Blvd / Rio Rd



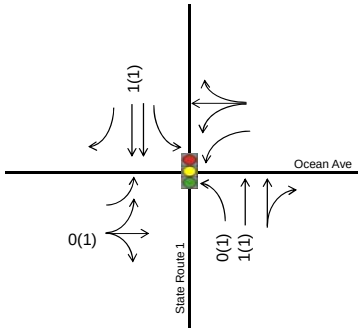
5. Carmel Center Pl / Rio Rd



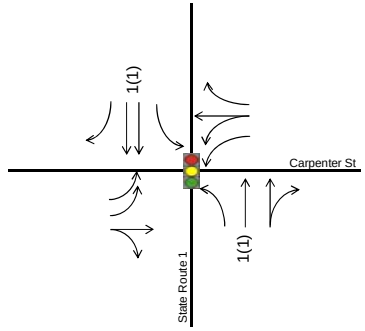
6. Carmel Rancho Blvd / Rio Rd



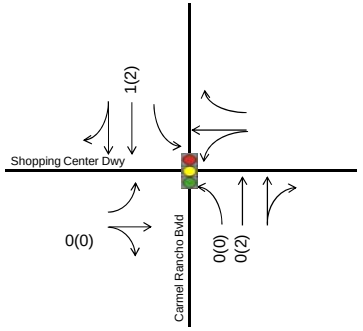
7. SR 1 / Ocean Ave



8. SR 1 / Carpenter St



9. Carmel Rancho Blvd / Shopping Center Dwy



LEGEND

Project Location

Traffic Signal

Study Intersection #

Lane Configuration

Stop Control

STOP

XX (YY) = AM (PM)

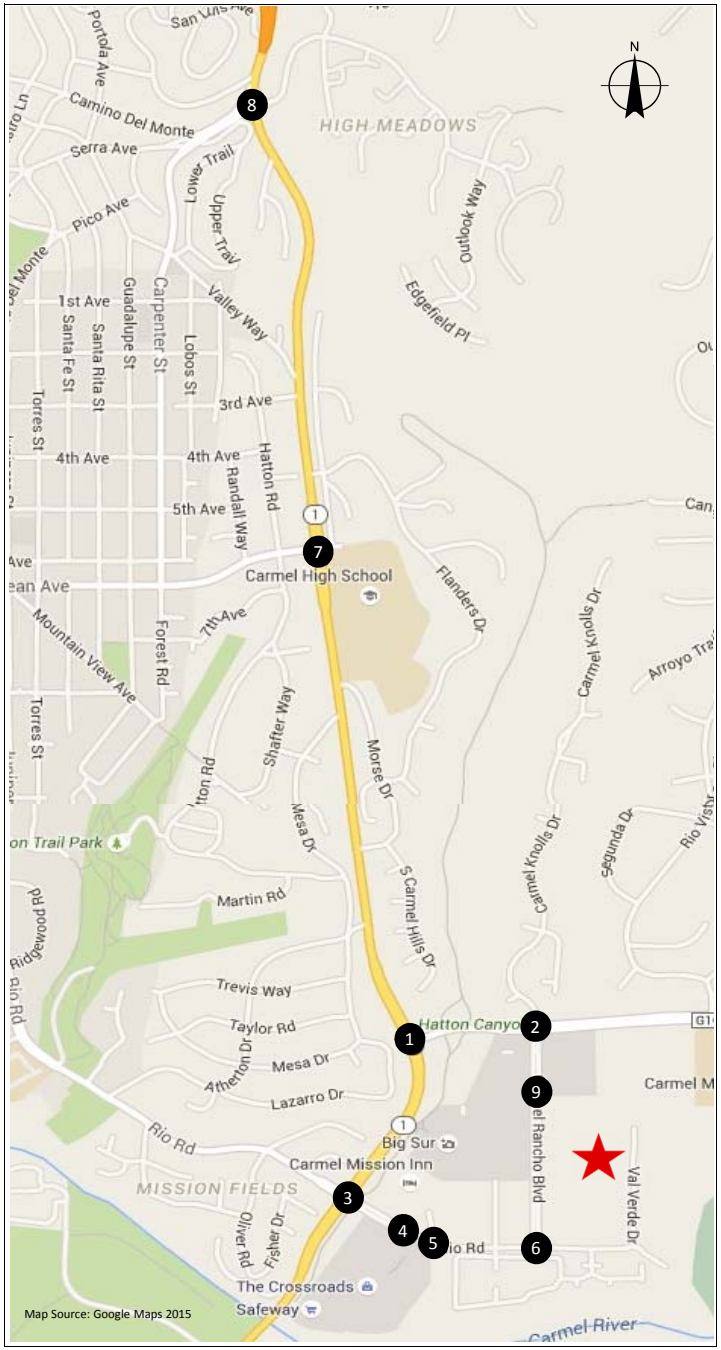
Hatch Mott MacDonald

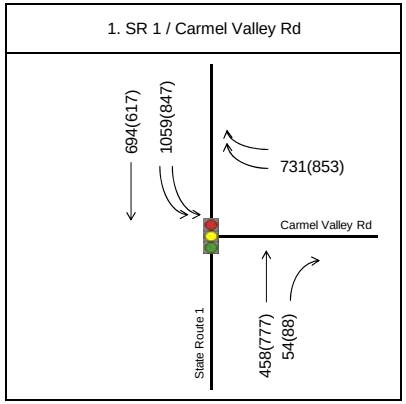
\\Gil-data-vm\fileserver\2015\Jobs\358717 - Carmel Rio Subdivision\Exhibits\3-x-16 Draft Report\358717 Alt 2 Project Volumes.xls

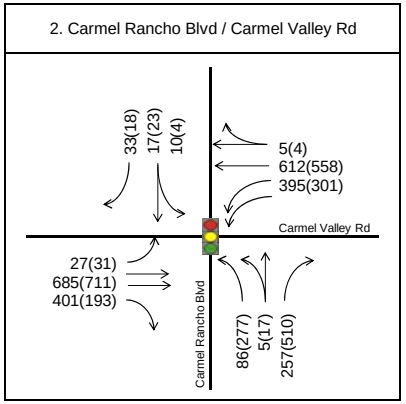
Exhibit 24

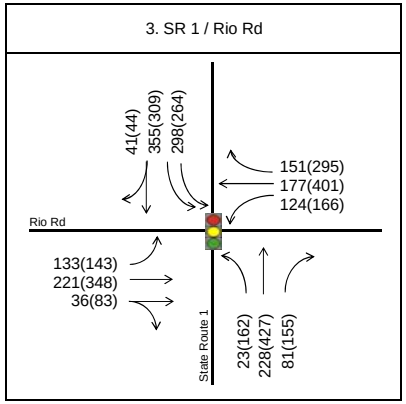
Project Alternative 2 Trip Assignment

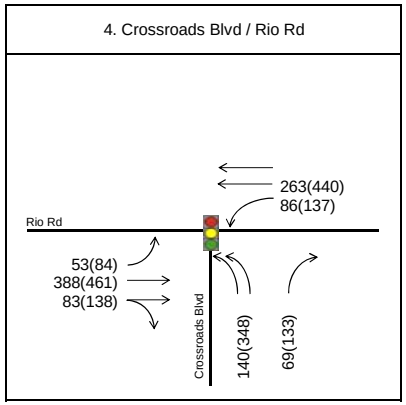
AM & PM Peak Hour Volumes

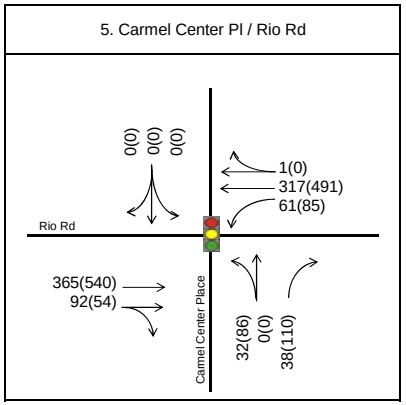


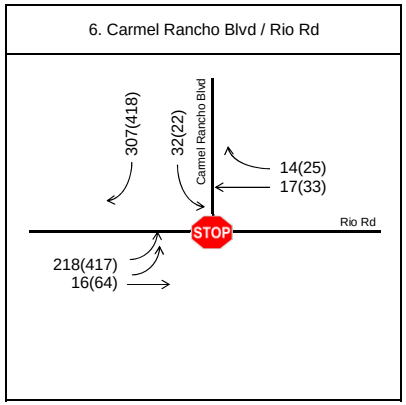


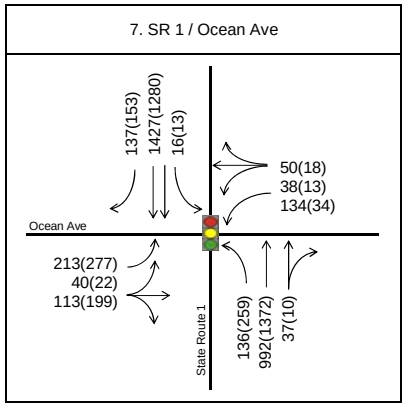


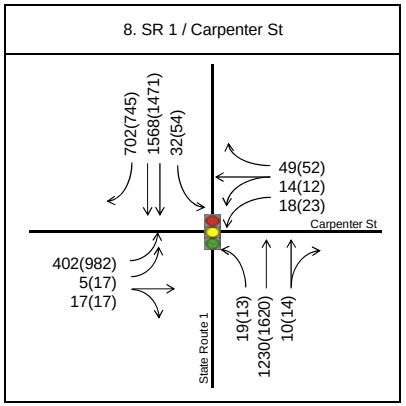


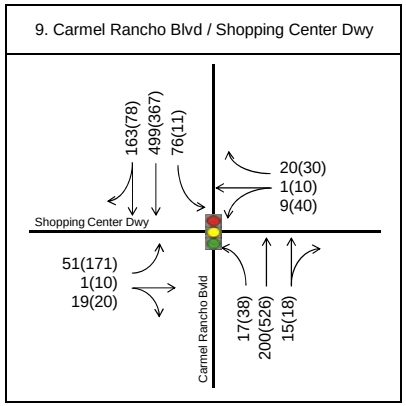












XX (YY) = AM (PM)

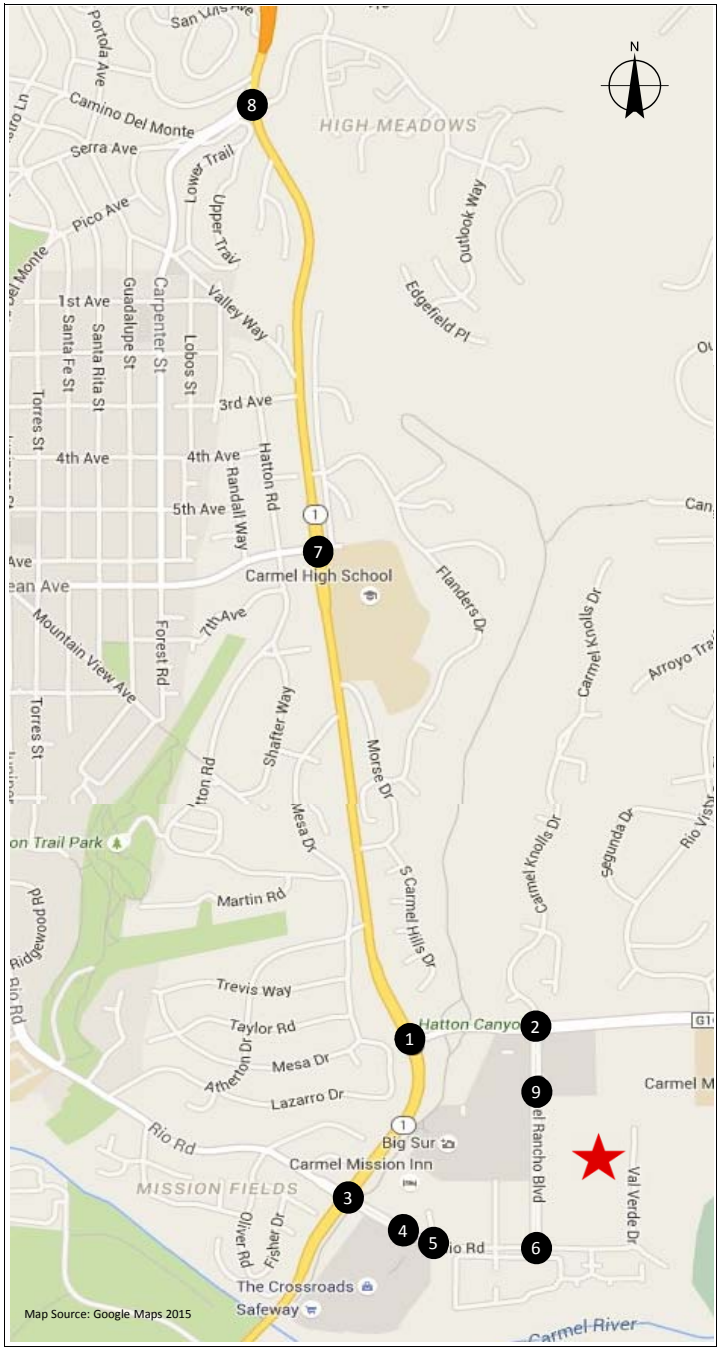
Hatch Mott MacDonald

\\Gil-data-vm\fileserver\2015\Jobs\358717 - Carmel Rio Subdivision\Exhibits\3-x-16 Draft Report\358717 Alt 2 Project Volumes.xls

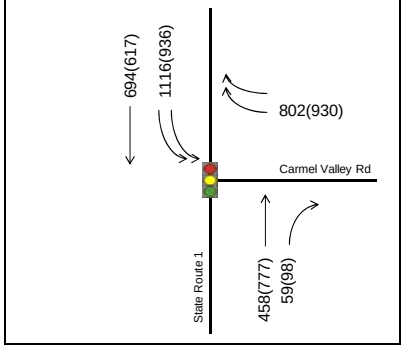
Exhibit 25

Existing Plus Project Alternative 2 Conditions

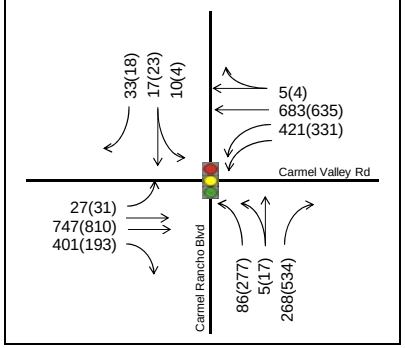
AM & PM Peak Hour Volumes



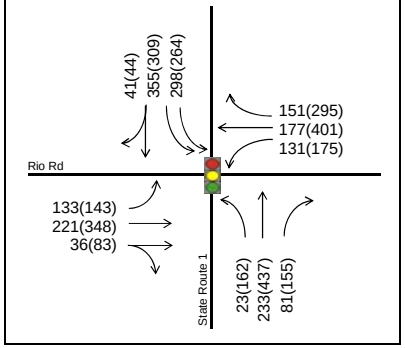
1. SR 1 / Carmel Valley Rd



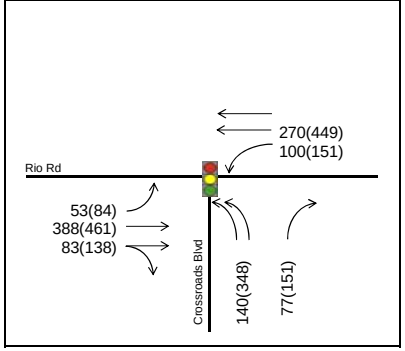
2. Carmel Rancho Blvd / Carmel Valley Rd



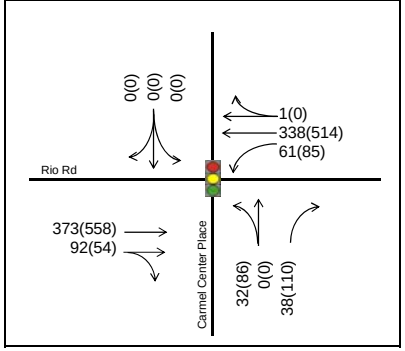
3. SR 1 / Rio Rd



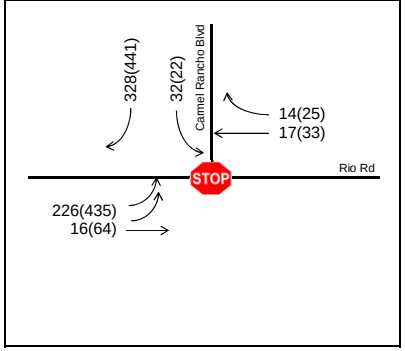
4. Crossroads Blvd / Rio Rd



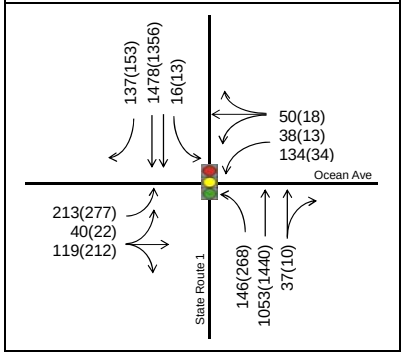
5. Carmel Center Pl / Rio Rd



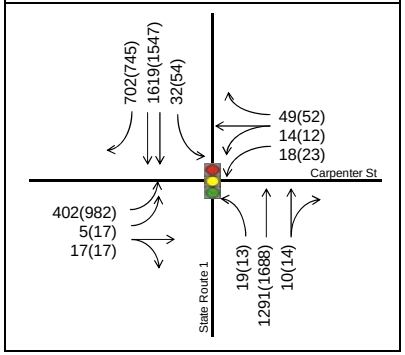
6. Carmel Rancho Blvd / Rio Rd



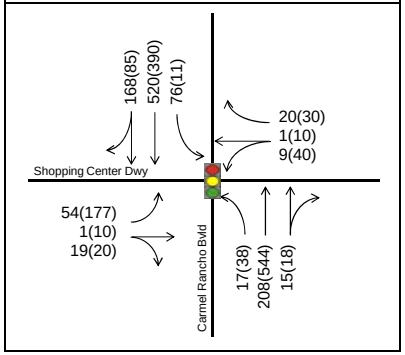
7. SR 1 / Ocean Ave



8. SR 1 / Carpenter St



9. Carmel Rancho Blvd / Shopping Center Dwy



LEGEND

Project Location

Traffic Signal

Study Intersection # (X)

Lane Configuration

Stop Control (STOP)

XX(YY) = AM (PM)

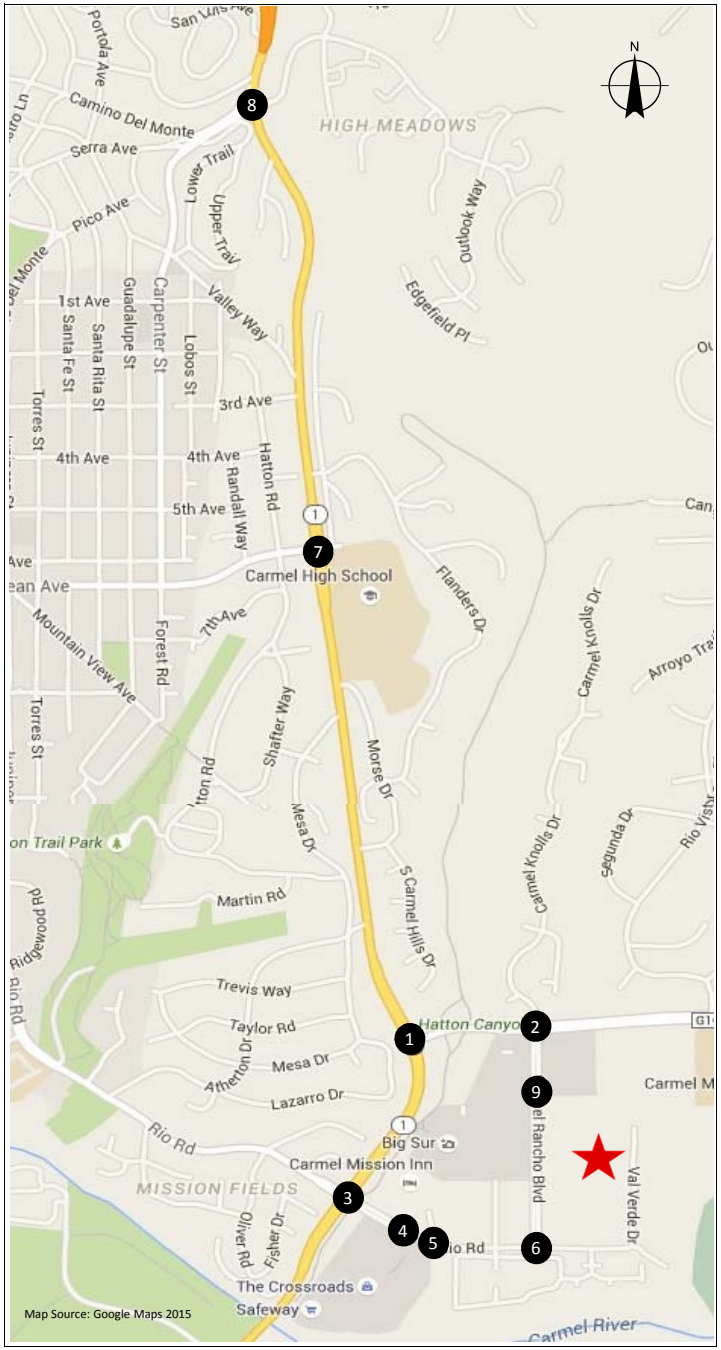
Hatch Mott MacDonald

\\Gil-data-vm\fileserver\2015\Jobs\358717 - Carmel Rio Subdivision\Exhibits\3-x-16 Draft Report\358717 Alt 2 Project Volumes.xls

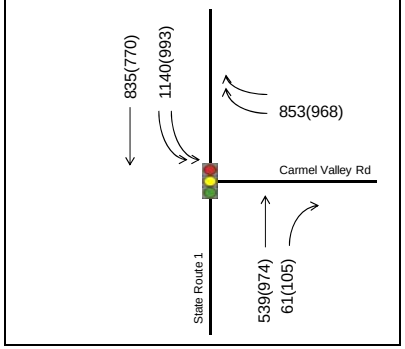
Exhibit 26

Background Plus Project Alternative 2 Conditions

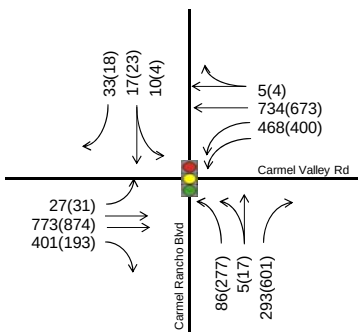
AM & PM Peak Hour Volumes



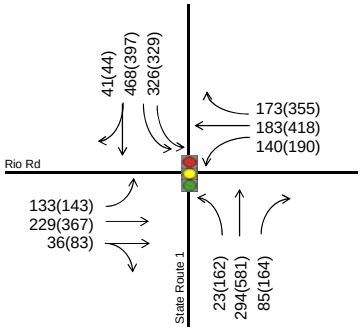
1. SR 1 / Carmel Valley Rd



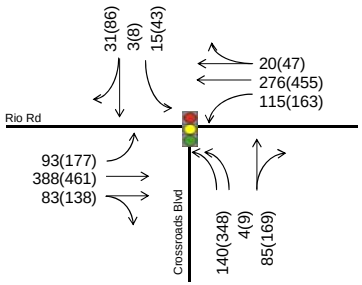
2. Carmel Rancho Blvd / Carmel Valley Rd



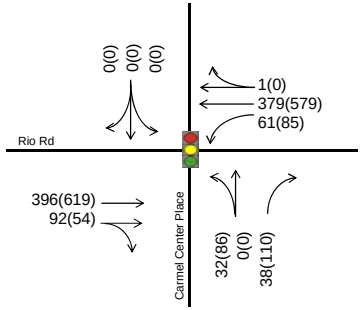
3. SR 1 / Rio Rd



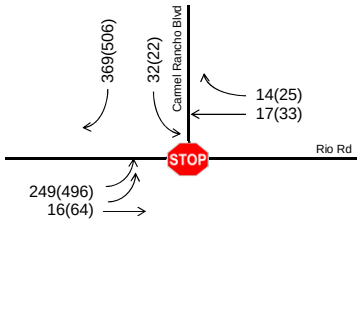
4. Crossroads Blvd / Rio Rd



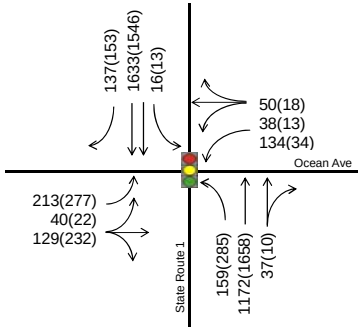
5. Carmel Center Pl / Rio Rd



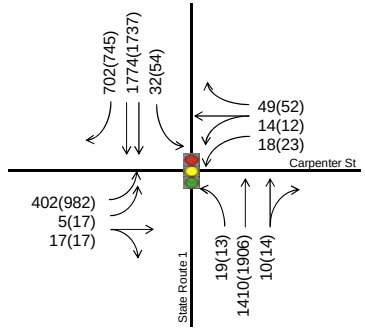
6. Carmel Rancho Blvd / Rio Rd



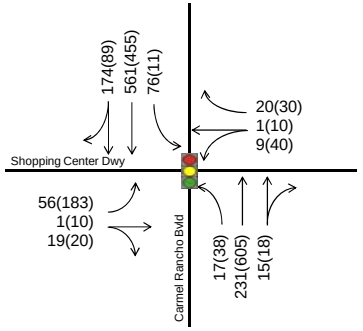
7. SR 1 / Ocean Ave



8. SR 1 / Carpenter St



9. Carmel Rancho Blvd / Shopping Center Dwy



LEGEND

Project Location

Traffic Signal

Study Intersection #

Lane Configuration

Stop Control

XX(YY) = AM (PM)

Hatch Mott MacDonald

\\Gil-data-vm\fileserver\2015\Jobs\358717 - Carmel Rio Subdivision\Exhibits\3-x-16 Draft Report\358717 Alt 2 Project Volumes.xls

Exhibit 27

Cumulative Plus Project Alternative 2 Conditions

AM & PM Peak Hour Volumes

	N-S Street	E-W Street	Existing Lane Configuration[1, 2]	Existing Intersection Control	LOS Standard Jurisdiction	Existing Conditions				Existing Plus Project Alt 2 Conditions				Background Conditions				Background Plus Project Alt 2 Conditions				Cumulative Conditions				Cumulative Plus Project Alt 2 Conditions			
						AM Pk Hr.		PM Pk Hr.		AM Pk Hr.		PM Pk Hr.		AM Pk Hr.		PM Pk Hr.		AM Pk Hr.		PM Pk Hr.		AM Pk Hr.		PM Pk Hr.		AM Pk Hr.		PM Pk Hr.	
						Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
1	SR 1	Carmel Valley Road	NB 1-T, 1-R SB 2-L, 1-T WB 2-R *With RTP Improvements*	Signal	C/D Caltrans	11.3	B	18.1	B	11.3	B	18.1	B	11.9	B	21.0	C	11.9	B	21.1	C	14.1	B	43.5	D	14.1 *9.5*	B *A*	43.7 *18.2*	D *B*
2	Carmel Rancho Blvd	Carmel Valley Road	NB 1-L, 1-L/T, 1-R SB 1-L/T, 1-R EB 1-L, 2-T, 1-R WB 2-L, 1-T, 1-T/R	Signal	C CVMP	16.9	B	19.3	B	16.9	B	19.3	B	18.4	B	20.2	C	18.4	B	20.2	C	22.0	C	22.6	C	22.1	C	22.6	C
3	SR 1	Rio Road	NB 1-L, 1-T, 1-R SB 2-L, 1-T/R EB 1-L, 1-T, 1-T/R WB 1-L, 1-T, 1-R *With RTP Improvements*	Signal	C/D Caltrans	22.6	C	37.9	D	22.6	C	37.9	D	22.8	C	38.6	D	22.8	C	38.6	D	26.7	C	54.0	D	26.7 *24.1*	C *C*	54.1 *40.6*	D *D*
4	Crossroads Blvd	Rio Road	NB 2-L, 1-T/R EB 1-L, 1-T, 1-T/R WB 1-L, 2-T	Signal	C CVMP	9.9	A	12.0	B	9.9	A	12.0	B	10.2	B	12.5	B	10.2	B	12.5	B	20.2	C	32.9	C	20.1	C	32.8	C
5	Carmel Center Place	Rio Road	NB 1-L/T, 1-R SB 1-L/T/R EB 1-T, 1-T/R WB 1-L, 1-T, 1-T/R	Signal	C CVMP	9.3	A	6.0	A	9.3	A	6.0	A	9.1	A	5.9	A	9.1	A	5.9	A	6.1	A	7.8	A	6.0	A	7.8	A
6	Carmel Rancho Blvd	Rio Road	SB 1-L, 1-R EB 2-L, 1-T WB 1-T, 1-R	Two-Way Stop SB EB WB	C CVMP	10.2 7.7 15.2	B A C	10.7 8.1 19.8	B A C	10.2 7.7 15.3	B A C	10.7 8.1 19.8	B A C	10.4 7.8 15.9	B A C	10.9 8.1 20.8	B A C	10.4 7.8 16.0	B A C	10.9 8.1 20.7	B A C	10.9 7.8 17.7	B A C	11.7 8.3 23.5	B A C	10.9 7.8 17.7	B A C	11.7 8.3 23.1	B A C
7	SR 1	Ocean Avenue	NB 1-L, 1-T, 1-T/R SB 1-L, 2-T, 1-R EB 1-L, 1-L/T/R WB 1-L, 1-L/T/R	Signal	C/D Caltrans	43.6	D	37.1	D	**43.7**	**D**	**37.2**	**D**	49.8	D	43.1	D	**49.9**	**D**	**43.3**	**D**	71.4	E	67.5	E	**71.5**	**E**	**67.7**	**E**
8	SR 1	Carpenter Street	NB 1-L, 1-T, 1-T/R SB 1-L, 2-T, 1-R EB 2-L, 1-T/R WB 1-L, 1-L/T, 1-R *With NB RT Lane*	Signal	C/D Caltrans	23.8	C	47.1	D	23.8 *23.7*	C *C*	47.3 *46.1*	D *D*	25.0	C	52.4	D	25.1 *24.9*	C *C*	52.5 *49.9*	D *D*	32.3	C	77.2	E	32.4 *30.3*	C *C*	77.4 *67.5*	E *E*
9	Carmel Rancho Blvd	Shopping Center Dwy	NB 1-L, 1-T, 1-T/R SB 1-L, 1-T, 1-T/R EB 1-L, 1-T/R WB 1-L/T, 1-R	Signal	C CVMP	4.0	A	5.5	A	4.0	A	5.6	A	4.0	A	5.6	A	4.0	A	5.6	A	4.0	A	5.8	A	4.0	A	5.8	A

Notes:

1 L, T, R = Left, Through, Right
2 NB, SB, EB, WB = Northbound, Southbound, Eastbound, Westbound
3 Level of service highlighted in red indicates that LOS exceeds the LOS standard.
4 Yellow highlight indicates project impact.
5 Bold type indicates unmitigated impact.

Hatch Mott MacDonald

\\Gil-data-vm\fileserver\2015\Jobs\358717 - Carmel Rio Subdivision\Exhibits\3-x-16 Draft Report\358717 Alt 2 Int LOS.xlsx

Exhibit 28
Project Alternative 2 Scenarios
Intersection Levels of Service

Seg #	Road Segment	Existing AM vs Existing + Project Alt 2 AM				Existing PM vs Existing + Project Alt 2 PM				Background AM vs Background + Project Alt 2 AM				Background PM vs Background + Project Alt 2 PM				Cumulative AM vs Cumulative + Project Alt 2 AM				Cumulative PM vs Cumulative + Project Alt 2 PM			
		Existing AM		Exist+Proj AM		Existing PM		Exis+Proj PM		Background AM		Back+Proj AM		Background PM		Back+Proj PM		Cumulative AM		Cum+Proj AM		Cumulative PM		Cum+Proj PM	
	NB Carmel Rancho Blvd	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	27.3	A	27.3	A	24.9	B	24.9	B	27.3	A	27.3	A	24.8	B	24.8	B	27.2	A	27.2	A	24.6	B	24.7	B
11	From Shopping Center Dwy to Carmel Valley Rd	9.5	D	9.5	D	8.9	E	8.9	E	9.2	D	9.2	D	8.6	E	8.5	E	9.1	D	9.1	D	8.3	E	8.2	E
	Total	17.5	C	17.5	C	16.2	C	16.2	C	17.2	C	17.2	C	15.8	C	15.8	C	17.1	C	17.1	C	15.4	C	15.4	C
	SB Carmel Rancho Blvd	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	18.3	C	18.3	C	16.8	C	16.8	C	18.2	C	18.2	C	16.7	C	16.7	C	18.1	C	18.1	C	16.4	C	16.5	C
12	From Shopping Center Dwy to Rio Rd	22.9	B	22.9	B	22.6	B	22.6	B	22.8	B	22.8	B	22.5	B	22.5	B	22.5	B	22.5	B	22.1	B	22.1	B
	Total	21.3	B	21.3	B	20.5	B	20.5	B	21.2	B	21.2	B	20.4	B	20.4	B	21.0	B	21.0	B	20.0	B	20.1	B
	EB Rio Rd	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	17.3	C	17.3	C	17.3	C	17.3	C	17.3	C	17.3	C	17.3	C	17.3	C	17.1	C	17.1	C	17.0	C	17.0	C
13	From SR 1 to Crossroads Blvd	12.9	D	12.9	D	11.7	D	11.7	D	12.6	D	12.6	D	11.7	D	11.6	D	10.9	D	10.9	D	9.2	D	9.2	D
14	From Crossroads Blvd to Carmel Center Pl	12.2	D	12.2	D	11.0	D	11.0	D	12.1	D	12.1	D	10.9	D	10.9	D	8.9	E	8.9	E	7.8	E	7.8	E
15	From Carmel Center Pl to Carmel Rancho Blvd	16.1	C	16.1	C	17.1	C	17.1	C	16.0	C	16.0	C	17.1	C	17.1	C	16.0	C	16.0	C	17.0	C	17.0	C
	Total	15.8	C	15.8	C	15.7	C	15.7	C	15.8	C	15.8	C	15.6	C	15.6	C	14.9	C	14.9	C	14.3	C	14.3	C
	WB Rio Rd	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	20.3	B	20.3	B	19.6	B	19.6	B	20.3	B	20.3	B	19.6	B	19.6	B	20.2	B	20.3	B	19.6	B	19.6	B
14	From Carmel Center Pl to Crossroads Blvd	9.6	D	9.6	D	8.3	E	8.3	E	9.6	D	9.6	D	8.4	E	8.3	E	6.8*	F	6.8*	F	4.8*	F	4.8*	F
13	From Crossroads Blvd to SR 1	7.3	E	7.3	E	7.2	E	7.2	E	7.3	E	7.3	E	7.2	E	7.2	E	7.2	E	7.2	E	6.9	F	6.9	F
5	From SR 1 to Atherton Dr	19.6	B	23.5	B	23.5	B	23.5	B	23.5	B	23.5	B	23.5	B	23.5	B	23.5	B	23.5	B	23.5	B	23.5	B
	Total	15.1	C	16.3	C	15.9	C	15.9	C	16.3	C	16.3	C	15.9	C	15.9	C	15.6	C	15.6	C	14.6	C	14.6	C
	NB SR 1	Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS	
1	From Ocean Ave to Carpenter St	C		C		D		D		C		C		D		D		C		C		D		D	
2	From Carmel Valley Rd to Ocean Ave	C		C		C		C		F		F		C		C		F		F		C		C	
3	From Rio Rd to Carmel Valley Rd	F		F		F		F		F		F		F		F		F		F		F		F	
4	From Ribera Rd to Rio Rd	B		B		B		B		B		B		B		B		B		B		B		B	
	SB SR 1	Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS		Arterial LOS	
1	From Carpenter St to Ocean Ave	D		D		C		C		D		D		C		C		D		D		C		C	
2	From Ocean Ave to Carmel Valley Rd	C		C		C		C		C		C		C		C		C		C		C		C	
3	From Carmel Valley Rd to Rio Rd	C		C		E		E		C		C		E		E		C		C		E		E	
4	From Rio Rd to Ribera Rd	B		B		B		B		B		B		B		B		B		B		B		B	

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.
2. Text highlighted in yellow indicates potential project impact.
3. * = Traffic flow on this segment is controlled by closely spaced intersections that operate acceptably. Therefore, project does not have an impact.
4. SR 1 road segment levels of service are referenced from the *Rancho Cañada Draft Transportation Impact Study Report* prepared by Central Coast Transportation Consulting (CCTC, January 2015)

Hatch Mott MacDonald

\\Gil-data-vm\fileserver\2015\Jobs\358717 - Carmel Rio Subdivision\Exhibits\5-26-16 Draft Report\358717 Alt 2 Arterial LOS_rev1.xlsx

Exhibit 29

Project Alternative 2 Scenarios

Arterial Level of Service Summary

Carmel Valley Road				Existing Conditions	Existing Plus Project Alt 1 Conditions	Background Conditions	Background + Project Alt 1 Conditions	Cumulative Conditions	Cumulative + Project Alt 1 Conditions
Segment	From	To	CVMP ADT Threshold	ADT	ADT	ADT	ADT	ADT	ADT
6	Robinson Canyon Rd	Schulte Rd	15,499	14,611	14,671	15,847	**15,907**	17,107	**17,167**
7	Schulte Rd	Rancho San Carlos Rd	16,340	15,974	16,034	17,865	**17,925**	19,125	**19,185**
8	Rancho San Carlos Rd	Rio Rd	48,487	18,982	19,042	21,046	21,106	22,706	22,766
9	Rio Rd	Carmel Rancho Blvd	51,401	24,228	24,288	26,319	26,379	28,699	28,759
10	Carmel Rancho Blvd	SR 1	27,839	22,006	22,182	23,606	23,782	24,626	24,802

Notes:

1. ADT highlighted in red indicates ADT exceeds ADT threshold.
2. ADT highlighted in yellow indicates ADT exceeds Carmel Valley Master Plan (CVMP) ADT Threshold and is a project impact.
3. Bold type indicates unmitigated impact.

Exhibit 30

Project Alternative 2 Scenarios

Road Segment ADT's

Segments 6 - 10

Appendix A

LOS Descriptions for Signalized Intersections

APPENDIX A

LEVEL OF SERVICE (LOS) DESCRIPTION
SIGNALIZED INTERSECTIONS

The capacity of an urban street is related primarily to the signal timing and the geometric characteristics of the facility as well as to the composition of traffic on the facility. Geometrics are a fixed characteristic of a facility. Thus, while traffic composition may vary somewhat over time, the capacity of a facility is generally a stable value that can be significantly improved only by initiating geometric improvements. A traffic signal essentially allocates time among conflicting traffic movements that seek to use the same space. The way in which time is allocated significantly affects the operation and the capacity of the intersection and its approaches.

The methodology for signalized intersection is designed to consider individual intersection approaches and individual lane groups within approaches. A lane group consists of one or more lanes on an intersection approach. The outputs from application of the method described in the HCM are reported on the basis of each lane. For a given lane group at a signalized intersection, three indications are displayed: green, yellow and red. The red indication may include a short period during which all indications are red, referred to as an all-red interval and the yellow indication forms the change and clearance interval between two green phases.

The methodology for analyzing the capacity and level of service must consider a wide variety of prevailing conditions, including the amount and distribution of traffic movements, traffic composition, geometric characteristics, and details of intersection signalization. The methodology addresses the capacity, LOS, and other performance measures for lane groups and the intersection approaches and the LOS for the intersection as a whole.

Capacity is evaluated in terms of the ratio of demand flow rate to capacity (v/c ratio), whereas LOS is evaluated on the basis of control delay per vehicle (in seconds per vehicle). The methodology does not take into account the potential impact of downstream congestion on intersection operation, nor does the methodology detect and adjust for the impacts of turn-pocket overflows on through traffic and intersection operation.

LEVEL OF SERVICE (LOS) CRITERIA FOR SIGNALIZED INTERSECTIONS
(Reference Highway Capacity Manual)

Level of Service	Control Delay (seconds / vehicle)
A	**<10**
B	**>10 - 20**
C	**>20 - 35**
D	**>35 - 55**
E	**>55 - 80**
F	**>80**

Appendix B

LOS Descriptions for Unsignalized Intersections

APPENDIX B

LEVEL OF SERVICE (LOS) DESCRIPTION
UNSIGNALIZED INTERSECTIONS WITH TWO-WAY STOP CONTROL (TWSC)

TWSC intersections are widely used and stop signs are used to control vehicle movements at such intersections. At TWSC intersections, the stop-controlled approaches are referred to as the minor street approaches; they can be either public streets or private driveways. The intersection approaches that are not controlled by stop signs are referred to as the major street approaches. A three-leg intersection is considered to be a standard type of TWSC intersection if the single minor street approach (i.e. the stem of the T configuration) is controlled by a stop sign. Three-leg intersections where two of the three approaches are controlled by stop signs are a special form of unsignalized intersection control.

At TWSC intersections, drivers on the controlled approaches are required to select gaps in the major street flow through which to execute crossing or turning maneuvers on the basis of judgement. In the presence of a queue, each driver on the controlled approach must use some time to move into the front-of-queue position and prepare to evaluate gaps in the major street flow. Capacity analysis at TWSC intersections depends on a clear description and understanding of the interaction of drivers on the minor or stop-controlled approach with drivers on the major street. Both gap acceptance and empirical models have been developed to describe this interaction.

Thus, the capacity of the controlled legs is based on three factors:

- the distribution of gaps in the major street traffic stream,;
- driver judgement in selecting gaps through which to execute the desired maneuvers; and
- the follow-up time required by each driver in a queue.

The delay experienced by a motorist is made up of a number of factors that relate to control, geometrics, traffic and incidents. Total delay is the difference between the travel time actually experienced and the reference travel time that would result during base conditions, in the absence of incident, control, traffic or geometric delay. Average control delay for any particular minor movement is a function of the capacity of the approach and the degree of saturation and referred to as level of service.

LEVEL OF SERVICE (LOS) CRITERIA FOR TWSC INTERSECTIONS

(Reference Highway Capacity Manual)

Level of Service	Control Delay (seconds / vehicle)
A	**0 - 10**
B	**>10 - 15**
C	**>15 - 25**
D	**>25 - 35**
E	**>35 - 50**
F	**>50**

Appendix C

LOS Descriptions for Road Segments – HCM Exhibits 14-4, 15-2, 15-3

Appendix C

HCM 2000 Exhibit 15-2
Urban Street LOS By Class

Urban Street Class	I	II	III	IV
Range of free-flow speeds (FFS)	55 to 45 mi/h	45 to 35 mi/h	35 to 30 mi/h	35 to 25 mi/h
Typical FFS	50 mi/h	40 mi/h	35 mi/h	30 mi/h
LOS	Average Travel Speed (mi/h)			
A	> 42	> 35	> 30	> 25
B	> 34–42	> 28–35	> 24–30	> 19–25
C	> 27–34	> 22–28	> 18–24	> 13–19
D	> 21–27	> 17–22	> 14–18	> 9–13
E	> 16–21	> 13–17	> 10–14	> 7–9
F	≤ 16	≤ 13	≤ 10	≤ 7

HCM 2010 Exhibit 14-4
Automobile LOS for Multilane Highways

LOS	FFS (mi/h)	Density (pc/mi/ln)
A	All	>0–11
B	All	>11–18
C	All	>18–26
D	All	>26–35
E	60	>35–40
	55	>35–41
	50	>35–43
	45	>35–45
F	Demand Exceeds Capacity	
	60	>40
	55	>41
	50	>43
	45	>45

HCM 2010 Exhibit 15-3
Automobile LOS for Two-Lane Highways

LOS	Class I Highways		Class II Highways	Class III Highways
	ATS (mi/h)	PTSF (%)	PTSF (%)	PFFS (%)
A	>55	≤35	≤40	>91.7
B	>50–55	>35–50	>40–55	>83.3–91.7
C	>45–50	>50–65	>55–70	>75.0–83.3
D	>40–45	>65–80	>70–85	>66.7–75.0
E	≤40	>80	>85	≤66.7

Appendix D

New Raw Counts and New vs. Previously Published Volumes – Comparison and Adjustments

Intersection Source and Date of Counts		AM Peak Hour NB L	T	R	SB L	T	R	EB L	T	R	WB L	T	R	Total	PM Peak Hour NB L	T	R	SB L	T	R	EB L	T	R	WB L	T	R	Total
1. SR 1 / Carmel Valley Rd		1. SR 1 / Carmel Valley Rd													1. SR 1 / Carmel Valley Rd												
Carmel Rio Rd Subdivision	July 2015	0	388	46	900	628	0	0	0	0	0	0	715	2,677	0	733	83	771	582	0	0	0	0	0	0	773	2,942
AM & PM Adjusted		0	457	54	1,059	739	0	0	0	0	0	0	842	3,151	0	776	88	816	616	0	0	0	0	0	0	818	3,114
Volumes Used in Analysis		**0**	**457**	**54**	**1,059**	**693**	**0**	**0**	**0**	**0**	**0**	**0**	**731**	**2,994**	**0**	**776**	**88**	**846**	**616**	**0**	**0**	**0**	**0**	**0**	**0**	**852**	**3,178**
Carmel Canine Sports Center	November 2014														0	740	58	862	518	0	0	0	0	0	0	926	3,104
Carmel Canine Sports Center	August 2014	0	302	99	997	519	0	0	0	0	0	0	846	2,763	0	716	69	802	611	0	0	0	0	0	0	836	3,034
Carmel Hill & River Bike Trail	March 2008	0	429	82	1,066	526	0	0	0	0	0	0	1,048	3,151	0	717	73	834	512	0	0	0	0	0	0	978	3,114
Val Verde Hexagon Study per DKS CVMP	2003	0	459	77	1,082	509	0	0	0	0	0	0	1,005	3,132	0	618	49	918	509	0	0	0	0	0	0	943	3,037
2. Carmel Rancho Blvd / Carmel Valley Rd		2. Carmel Rancho Blvd / Carmel Valley Rd													2. Carmel Rancho Blvd / Carmel Valley Rd												
Carmel Rio Rd Subdivision	July 2015	86	4	197	8	13	33	21	609	308	302	612	4	2,197	250	15	461	4	21	16	28	644	174	272	505	1	2,391
AM & PM Adjusted		112	5	257	10	17	43	27	794	401	394	798	5	2,863	276	17	509	4	23	18	31	711	192	300	558	1	2,640
Volumes Used in Analysis		**86**	**5**	**257**	**10**	**17**	**33**	**27**	**685**	**401**	**394**	**612**	**5**	**2,532**	**276**	**17**	**509**	**4**	**23**	**18**	**31**	**711**	**192**	**300**	**558**	**4**	**2,643**
Val Verde Hexagon Study per DKS CVMP	2003	114	7	207	5	18	30	31	789	315	430	913	4	2,863	372	9	500	4	15	8	31	640	280	271	507	4	2,641
3. SR 1 / Rio Rd		3. SR 1 / Rio Rd													3. SR 1 / Rio Rd												
Carmel Rio Rd Subdivision	July 2015	21	149	73	269	321	37	120	200	33	112	160	136	1,631	162	427	155	263	305	44	106	347	83	166	400	265	2,723
AM: Adjusted, PM: Using July 2015 Counts		23	165	81	297	355	41	133	221	36	124	177	150	1,803	162	427	155	263	305	44	106	347	83	166	400	265	2,723
Volumes Used in Analysis		**23**	**228**	**81**	**297**	**355**	**41**	**133**	**221**	**36**	**124**	**177**	**150**	**1,866**	**162**	**427**	**155**	**263**	**309**	**44**	**143**	**347**	**83**	**166**	**400**	**294**	**2,793**
Carmel Hill & River Bike Trail	March 2008	9	108	75	237	219	62	227	261	31	66	234	152	1,681	16	265	129	259	148	51	150	287	34	144	339	374	2,196
Val Verde Hexagon Study per DKS CVMP	2003	41	177	89	245	207	68	183	268	33	83	248	160	1,802	53	319	134	267	260	85	143	348	61	160	368	341	2,539
4. Crossroads Blvd / Rio Rd		4. Crossroads Blvd / Rio Rd													4. Crossroads Blvd / Rio Rd												
Carmel Rio Rd Subdivision	July 2015	133	0	65	0	0	0	50	335	79	82	223	0	967	348	0	133	0	0	0	84	374	138	137	395	0	1,609
AM: Adjusted, PM: Using July 2015 Counts		140	0	69	0	0	0	53	353	83	86	235	0	1,019	348	0	133	0	0	0	84	374	138	137	395	0	1,609
Volumes Used in Analysis		**140**	**0**	**69**	**0**	**0**	**0**	**53**	**387**	**83**	**86**	**262**	**0**	**1,080**	**348**	**0**	**133**	**0**	**0**	**0**	**84**	**459**	**138**	**137**	**438**	**0**	**1,737**
Val Verde Hexagon Study per DKS CVMP	2005	94	0	40	0	0	0	72	357	49	48	360	0	1,020	244	0	116	0	0	0	0	379	105	120	438	0	1,402
5. Carmel Center Pl / Rio Rd		5. Carmel Center Pl / Rio Rd													5. Carmel Center Pl / Rio Rd												
Carmel Rio Rd Subdivision	July 2015	28	0	34	0	0	0	0	323	82	54	280	1	802	78	0	110	0	0	0	0	461	46	85	452	0	1,232
AM: Adjusted, PM: Using July 2015 Counts		32	0	38	0	0	0	0	364	92	61	316	1	904	78	0	110	0	0	0	0	461	46	85	452	0	1,232
Volumes Used in Analysis		**32**	**0**	**38**	**0**	**0**	**0**	**0**	**364**	**92**	**61**	**316**	**1**	**904**	**86**	**0**	**110**	**0**	**0**	**0**	**0**	**538**	**54**	**85**	**489**	**0**	**1,362**
Val Verde Hexagon Study per DKS CVMP	2005	22	0	21	0	0	0	0	342	84	69	366	0	904	86	0	102	0	0	0	0	425	58	30	444	0	1,145
6. Carmel Rancho Blvd / Rio Rd		6. Carmel Rancho Blvd / Rio Rd													6. Carmel Rancho Blvd / Rio Rd												
Carmel Rio Rd Subdivision	July 2015	15	13	0	0	14	263	191	0	14	0	0	0	510	14	19	0	0	20	417	416	0	22	0	0	0	908
AM & PM Adjusted		16	14	0	0	15	284	206	0	15	0	0	0	550	14	19	0	0	20	418	417	0	22	0	0	0	910
Volumes Used in Analysis		**16**	**14**	**0**	**0**	**31**	**307**	**218**	**0**	**15**	**0**	**0**	**0**	**601**	**31**	**23**	**0**	**0**	**20**	**418**	**417**	**0**	**62**	**0**	**0**	**0**	**971**
Val Verde Hexagon Study per DKS CVMP	2004	20	16	0	0	31	287	175	0	21	0	0	0	550	31	23	0	0	32	392	410	0	23	0	0	0	911
7. SR 1 / Ocean Ave		7. SR 1 / Ocean Ave													7. SR 1 / Ocean Ave												
Carmel Rio Rd Subdivision	July 2015	112	1018	6	5	1426	137	166	5	113	32	8	2	3,030	235	1248	3	12	1164	139	252	17	180	22	23	8	3,303
AM: Using 11/06 Counts, PM: Partially Adjusted & 11/06 Counts		136	991	37	16	1,376	131	213	40	113	134	38	50	3,275	258	1371	10	13	1279	153	277	22	198	34	13	18	3,646
Volumes Used in Analysis		**136**	**991**	**37**	**16**	**1,426**	**137**	**213**	**40**	**113**	**134**	**38**	**50**	**3,331**	**258**	**1371**	**10**	**13**	**1279**	**153**	**277**	**22**	**198**	**34**	**13**	**18**	**3,646**
Carmel Hill & River Bike Trail	March 2008	123	1062	41	3	1362	159	201	34	83	91	31	15	3,205	147	1506	8	17	1159	171	286	13	147	61	13	15	3,543
Villas de Carmelo	November 2006	136	991	37	16	1376	131	213	40	113	134	38	50	3,275	157	1513	10	5	1282	151	281	22	143	34	13	18	3,629
8. SR 1 / Carpenter St		8. SR 1 / Carpenter St													8. SR 1 / Carpenter St												
Carmel Rio Rd Subdivision	July 2015	18	1138	9	30	1567	650	372	5	16	17	13	45	3,880	12	1463	13	52	1405	712	982	16	16	22	11	50	4,754
AM & PM Adjusted		19	1,229	10	32	1,693	702	402	5	17	18	14	49	4,190	13	1530	14	54	1470	745	1027	17	17	23	12	52	4,974
Volumes Used in Analysis		**19**	**1,229**	**10**	**32**	**1,567**	**702**	**402**	**5**	**17**	**18**	**14**	**49**	**4,064**	**13**	**1619**	**14**	**54**	**1470**	**745**	**982**	**17**	**17**	**23**	**12**	**52**	**5,018**
Villas de Carmelo	November 2006	38	1219	10	37	1496	730	498	11	34	29	26	63	4,191	35	1797	8	83	1437	726	779	13	31	10	14	40	4,973
9. Carmel Rancho Blvd / Shopping Center Dwy		9. Carmel Rancho Blvd / Shopping Center Dwy													9. Carmel Rancho Blvd / Shopping Center Dwy												
Carmel Rio Rd Subdivision	August 2015	15	177	13	12	441	123	45	1	17	8	1	3	856	38	524	18	11	365	78	171	10	20	40	10	30	1,315
AM: 13% adj factor per Int #5, PM: Using 8/15 Counts	1.13	17	200	15	14	498	139	51	1	19	9	1	3	967	38	524	18	11	365	78	171	10	20	40	10	30	1,315
Volumes Used in Analysis		**17**	**200**	**15**	**76**	**498**	**163**	**51**	**1**	**19**	**9**	**1**	**20**	**1,070**	**38**	**524**	**18**	**11**	**365**	**78**	**171**	**10**	**20**	**40**	**10**	**30**	**1,315**

Notes:
1. "Adjusted" means new count (by movement) has been multiplied by the ratio of the highest available total entering volume and the new total entering volume to obtain adjusted volume.
2. Highest "total entering intersection" volume highlighted in red.
3. Lowest "total entering intersection" volume highlighted in yellow.
4. "Volumes Used in Analysis" are the final volumes used after adjusting & balancing.

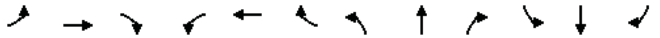
Appendix E

Intersection Level of Service Calculation Worksheets

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	0	731	457	54	1059	693
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9	4.9	4.9	4.0
Lane Util. Factor		0.88	1.00	1.00	0.97	1.00
Frt		0.85	1.00	0.85	1.00	1.00
Flt Protected		1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		2760	1863	1509	3335	1759
Flt Permitted		1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		2760	1863	1509	3335	1759
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	795	497	59	1151	753
RTOR Reduction (vph)	0	260	0	12	0	0
Lane Group Flow (vph)	0	535	497	47	1151	753
Heavy Vehicles (%)	0%	3%	2%	7%	5%	8%
Turn Type		Over	NA	Perm	Prot	NA
Protected Phases		3	2		3	Free
Permitted Phases				2		
Actuated Green, G (s)		25.1	20.5	20.5	25.1	55.4
Effective Green, g (s)		25.1	20.5	20.5	25.1	55.4
Actuated g/C Ratio		0.45	0.37	0.37	0.45	1.00
Clearance Time (s)		4.9	4.9	4.9	4.9	
Vehicle Extension (s)		4.5	3.5	3.5	4.5	
Lane Grp Cap (vph)		1250	689	558	1510	1759
v/s Ratio Prot		0.19	c0.27		c0.35	0.43
v/s Ratio Perm				0.03		
v/c Ratio		0.43	0.72	0.08	0.76	0.43
Uniform Delay, d1		10.3	15.0	11.3	12.7	0.0
Progression Factor		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.4	3.9	0.1	2.6	0.8
Delay (s)		10.7	18.9	11.4	15.3	0.8
Level of Service		B	B	B	B	A
Approach Delay (s)	10.7		18.1			9.5
Approach LOS	B		B			A

Intersection Summary			
HCM 2000 Control Delay	11.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	55.4	Sum of lost time (s)	9.8
Intersection Capacity Utilization	62.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	27	685	401	394	612	5	86	5	257	10	17	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		0.95	0.95	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00	1.00		1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.98	1.00
Satd. Flow (prot)	1736	3374	1563	3467	3501		1618	1641	1524		1681	1560
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.98	1.00
Satd. Flow (perm)	1736	3374	1563	3467	3501		1618	1641	1524		1681	1560
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	31	778	456	448	695	6	98	6	292	11	19	38
RTOR Reduction (vph)	0	0	291	0	1	0	0	0	243	0	0	37
Lane Group Flow (vph)	31	778	165	448	700	0	52	52	49	0	30	1
Confl. Peds. (#/hr)	2		1			1	1			1		2
Heavy Vehicles (%)	4%	7%	2%	1%	3%	0%	6%	0%	6%	30%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Over	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	7	7	
Permitted Phases			2									7
Actuated Green, G (s)	1.8	20.2	20.2	9.3	27.8		4.3	4.3	9.3		1.5	1.5
Effective Green, g (s)	1.8	20.2	20.2	9.3	27.8		4.3	4.3	9.3		1.5	1.5
Actuated g/C Ratio	0.03	0.36	0.36	0.17	0.50		0.08	0.08	0.17		0.03	0.03
Clearance Time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Vehicle Extension (s)	1.0	1.3	1.3	1.0	1.3		1.0	1.0	1.0		1.0	1.0
Lane Grp Cap (vph)	56	1223	566	578	1747		124	126	254		45	42
v/s Ratio Prot	0.02	c0.23		c0.13	0.20		c0.03	0.03	0.03		c0.02	
v/s Ratio Perm			0.11									0.00
v/c Ratio	0.55	0.64	0.29	0.78	0.40		0.42	0.41	0.19		0.67	0.02
Uniform Delay, d1	26.6	14.7	12.7	22.2	8.7		24.5	24.5	20.0		26.9	26.4
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	6.6	0.8	0.1	5.9	0.1		0.8	0.8	0.1		25.2	0.1
Delay (s)	33.1	15.5	12.8	28.1	8.8		25.3	25.3	20.1		52.1	26.5
Level of Service	C	B	B	C	A		C	C	C		D	C
Approach Delay (s)		14.9			16.3			21.5			37.8	
Approach LOS		B			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	16.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	55.7	Sum of lost time (s)	20.4
Intersection Capacity Utilization	52.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	133	221	36	124	177	150	23	228	81	297	355	41
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1842	1900	1863	1810	1827	1759	1827	1863	1827	1820	1900
Adj Flow Rate, veh/h	145	240	39	135	192	163	25	248	88	323	386	45
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	2	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	3	3	2	5	4	8	4	2	4	4	4
Cap, veh/h	216	638	102	212	378	321	76	447	385	504	558	65
Arrive On Green	0.12	0.21	0.21	0.12	0.21	0.21	0.05	0.24	0.24	0.15	0.35	0.35
Sat Flow, veh/h	1774	3021	484	1774	1810	1534	1675	1827	1574	3375	1599	186
Grp Volume(v), veh/h	145	138	141	135	192	163	25	248	88	323	0	431
Grp Sat Flow(s),veh/h/ln	1774	1750	1755	1774	1810	1534	1675	1827	1574	1688	0	1785
Q Serve(g_s), s	4.7	4.0	4.1	4.3	5.6	5.6	0.9	7.1	2.7	5.4	0.0	12.4
Cycle Q Clear(g_c), s	4.7	4.0	4.1	4.3	5.6	5.6	0.9	7.1	2.7	5.4	0.0	12.4
Prop In Lane	1.00		0.28	1.00		1.00	1.00		1.00	1.00		0.10
Lane Grp Cap(c), veh/h	216	370	371	212	378	321	76	447	385	504	0	623
V/C Ratio(X)	0.67	0.37	0.38	0.64	0.51	0.51	0.33	0.55	0.23	0.64	0.00	0.69
Avail Cap(c_a), veh/h	275	814	817	275	842	714	224	792	682	580	0	842
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	25.2	20.2	20.3	25.2	21.0	21.0	27.7	19.8	18.1	24.0	0.0	16.8
Incr Delay (d2), s/veh	4.3	0.8	0.8	3.2	1.3	1.5	2.5	1.3	0.4	1.9	0.0	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	2.0	2.1	2.3	3.0	2.5	0.5	3.7	1.2	2.6	0.0	6.4
LnGrp Delay(d),s/veh	29.5	21.0	21.1	28.3	22.2	22.5	30.2	21.1	18.5	25.9	0.0	18.5
LnGrp LOS	C	C	C	C	C	C	C	C	B	C		B
Approach Vol, veh/h		424			490			361			754	
Approach Delay, s/veh		23.9			24.0			21.1			21.7	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.9	16.9	6.4	25.8	11.0	16.7	12.7	19.6
Change Period (Y+Rc), s	3.7	* 4.2	3.7	4.9	3.7	* 4.2	3.7	4.9
Max Green Setting (Gmax), s	9.3	* 28	8.0	28.3	9.3	* 28	10.3	26.0
Max Q Clear Time (g_c+I1), s	6.3	6.1	2.9	14.4	6.7	7.6	7.4	9.1
Green Ext Time (p_c), s	0.1	4.2	0.0	4.2	0.1	4.1	0.3	4.6

Intersection Summary		
HCM 2010 Ctrl Delay		22.6
HCM 2010 LOS		C

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	53	387	83	86	262	0	140	0	69	0	0	0
Number	5	2	12	1	6	16	3	8	18			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1900	1860	1900	1810	1792	0	1810	1696	1900			
Adj Flow Rate, veh/h	58	425	91	95	288	0	154	0	76			
Adj No. of Lanes	1	2	0	1	2	0	2	1	0			
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91			
Percent Heavy Veh, %	0	2	2	5	6	0	5	0	5			
Cap, veh/h	80	1759	374	118	2148	0	317	0	137			
Arrive On Green	0.04	0.61	0.61	0.14	1.00	0.00	0.09	0.00	0.09			
Sat Flow, veh/h	1810	2900	616	1723	3495	0	3343	0	1442			
Grp Volume(v), veh/h	58	258	258	95	288	0	154	0	76			
Grp Sat Flow(s),veh/h/ln	1810	1767	1749	1723	1703	0	1672	0	1442			
Q Serve(g_s), s	1.6	3.4	3.4	2.7	0.0	0.0	2.2	0.0	2.5			
Cycle Q Clear(g_c), s	1.6	3.4	3.4	2.7	0.0	0.0	2.2	0.0	2.5			
Prop In Lane	1.00		0.35	1.00		0.00	1.00		1.00			
Lane Grp Cap(c), veh/h	80	1071	1061	118	2148	0	317	0	137			
V/C Ratio(X)	0.72	0.24	0.24	0.80	0.13	0.00	0.49	0.00	0.56			
Avail Cap(c_a), veh/h	199	1071	1061	224	2148	0	1070	0	461			
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.88	0.88	0.88	1.00	1.00	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	23.6	4.5	4.5	21.2	0.0	0.0	21.5	0.0	21.6			
Incr Delay (d2), s/veh	4.0	0.5	0.5	4.7	0.1	0.0	0.4	0.0	1.3			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.9	1.7	1.7	1.4	0.0	0.0	1.0	0.0	1.0			
LnGrp Delay(d),s/veh	27.6	5.0	5.0	26.0	0.1	0.0	21.9	0.0	22.9			
LnGrp LOS	C	A	A	C	A		C		C			
Approach Vol, veh/h		574			383			230				
Approach Delay, s/veh		7.3			6.5			22.2				
Approach LOS		A			A			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	6.9	34.3			5.7	35.5		8.7
Change Period (Y+Rc), s	3.5	4.0			3.5	4.0		4.0
Max Green Setting (Gmax), s	6.5	16.0			5.5	17.0		16.0
Max Q Clear Time (g_c+I1), s	4.7	5.4			3.6	2.0		4.5
Green Ext Time (p_c), s	0.0	2.8			0.0	3.3		0.4

Intersection Summary		
HCM 2010 Ctrl Delay		9.9
HCM 2010 LOS		A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	364	92	61	316	1	32	0	38	0	0	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	0.99		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1820	1900	1845	1845	1900	1900	1638	1712	1900	1900	1900
Adj Flow Rate, veh/h	0	439	111	73	381	1	39	0	46	0	0	0
Adj No. of Lanes	0	2	0	1	2	0	0	1	1	0	1	0
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	0	4	4	3	3	3	0	0	11	0	0	0
Cap, veh/h	0	1816	455	91	2814	7	212	0	80	0	105	0
Arrive On Green	0.00	0.22	0.22	0.05	0.78	0.78	0.06	0.00	0.06	0.00	0.00	0.00
Sat Flow, veh/h	0	2830	687	1757	3586	9	1228	0	1444	0	1900	0
Grp Volume(v), veh/h	0	276	274	73	186	196	39	0	46	0	0	0
Grp Sat Flow(s),veh/h/ln	0	1729	1697	1757	1753	1843	1228	0	1444	0	1900	0
Q Serve(g_s), s	0.0	6.6	6.7	2.1	1.3	1.3	1.5	0.0	1.6	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	6.6	6.7	2.1	1.3	1.3	1.5	0.0	1.6	0.0	0.0	0.0
Prop In Lane	0.00		0.40	1.00		0.01	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	0	1146	1125	91	1375	1446	212	0	80	0	105	0
V/C Ratio(X)	0.00	0.24	0.24	0.80	0.14	0.14	0.18	0.00	0.57	0.00	0.00	0.00
Avail Cap(c_a), veh/h	0	1146	1125	193	1375	1446	537	0	462	0	608	0
HCM Platoon Ratio	1.00	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.98	0.98	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	9.2	9.2	23.5	1.3	1.3	23.0	0.0	23.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.5	0.5	6.1	0.2	0.2	0.2	0.0	2.4	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.3	3.3	1.1	0.6	0.7	0.5	0.0	0.7	0.0	0.0	0.0
LnGrp Delay(d),s/veh	0.0	9.6	9.7	29.5	1.5	1.5	23.2	0.0	25.4	0.0	0.0	0.0
LnGrp LOS		A	A	C	A	A	C		C			
Approach Vol, veh/h		550			455			85			0	
Approach Delay, s/veh		9.7			6.0			24.4			0.0	
Approach LOS		A			A			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	6.1	37.1		6.8		43.2		6.8
Change Period (Y+Rc), s	3.5	4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s	5.5	17.0		16.0		26.0		16.0
Max Q Clear Time (g_c+I1), s	4.1	8.7		0.0		3.3		3.6
Green Ext Time (p_c), s	0.0	3.9		0.0		6.8		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	9.3
HCM 2010 LOS	A

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	218	0	15	0	1	0	16	14	0	0	31	307
Conflicting Peds, #/hr	2	0	2	0	0	0	2	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	210	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	1	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	92	80	92	92	92	80	80	92	92	80	80
Heavy Vehicles, %	7	0	0	2	2	2	0	7	0	0	0	2
Mvmt Flow	272	0	19	0	1	0	20	18	0	0	39	384

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	3	0	0	2	0	0	24	550	2	14	550	5
Stage 1	-	-	-	-	-	-	2	547	-	3	3	-
Stage 2	-	-	-	-	-	-	22	3	-	11	547	-
Critical Hdwy	4.17	-	-	-	-	-	7.1	6.57	-	7.1	6.5	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.57	-	-	-	-
Follow-up Hdwy	2.263	-	-	-	-	-	3.5	4.063	-	3.5	4	3.318
Pot Cap-1 Maneuver	1587	-	-	-	-	-	993	436	-	1007	446	1078
Stage 1	-	-	-	-	-	-	-	-	-	1025	897	-
Stage 2	-	-	-	-	-	-	1002	883	-	-	-	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1584	-	-	-	-	-	572	360	-	-	368	1074
Mov Cap-2 Maneuver	-	-	-	-	-	-	372	1061	-	-	~ -783	-
Stage 1	-	-	-	-	-	-	-	-	-	847	896	-
Stage 2	-	-	-	-	-	-	615	882	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	7.2	0		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	372	-	1584	-	-	-	-	-	-	1074
HCM Lane V/C Ratio	0.054	-	0.172	-	-	-	-	-	-	0.357
HCM Control Delay (s)	15.2	-	7.7	-	-	0	-	-	-	10.2
HCM Lane LOS	C	-	A	-	-	A	-	-	-	B
HCM 95th %tile Q(veh)	0.2	-	0.6	-	-	-	-	-	-	1.6

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	213	40	113	134	38	50	136	991	37	16	1426	137
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.94	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1869	1900	1900	1842	1900	1827	1839	1900	1357	1827	1845
Adj Flow Rate, veh/h	210	94	130	128	81	57	156	1139	43	18	1639	0
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	3	0	0	0	9	9	4	3	3	40	4	3
Cap, veh/h	288	114	158	151	82	58	163	1826	69	37	1620	732
Arrive On Green	0.16	0.16	0.16	0.08	0.08	0.08	0.09	0.53	0.53	0.03	0.47	0.00
Sat Flow, veh/h	1757	697	965	1810	977	688	1740	3432	130	1293	3471	1568
Grp Volume(v), veh/h	210	0	224	128	0	138	156	580	602	18	1639	0
Grp Sat Flow(s),veh/h/ln	1757	0	1662	1810	0	1665	1740	1747	1814	1293	1736	1568
Q Serve(g_s), s	10.0	0.0	11.5	6.2	0.0	7.3	7.9	20.6	20.6	1.2	41.3	0.0
Cycle Q Clear(g_c), s	10.0	0.0	11.5	6.2	0.0	7.3	7.9	20.6	20.6	1.2	41.3	0.0
Prop In Lane	1.00		0.58	1.00		0.41	1.00		0.07	1.00		1.00
Lane Grp Cap(c), veh/h	288	0	272	151	0	139	163	930	965	37	1620	732
V/C Ratio(X)	0.73	0.00	0.82	0.85	0.00	0.99	0.96	0.62	0.62	0.49	1.01	0.00
Avail Cap(c_a), veh/h	318	0	300	151	0	139	163	930	965	107	1620	732
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	35.1	0.0	35.8	40.0	0.0	40.5	39.9	14.5	14.5	42.4	23.6	0.0
Incr Delay (d2), s/veh	7.9	0.0	16.0	34.4	0.0	73.5	57.3	1.7	1.6	9.9	25.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.5	0.0	6.5	4.5	0.0	6.2	6.4	10.3	10.6	0.5	25.3	0.0
LnGrp Delay(d),s/veh	43.1	0.0	51.7	74.3	0.0	114.0	97.2	16.2	16.1	52.3	48.9	0.0
LnGrp LOS	D		D	E		F	F	B	B	D	F	
Approach Vol, veh/h		434			266			1338			1657	
Approach Delay, s/veh		47.5			94.9			25.6			48.9	
Approach LOS		D			F			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		18.7	12.0	46.2		11.6	6.2	52.0
Change Period (Y+Rc), s		* 4.2	3.7	4.9		4.2	3.7	4.9
Max Green Setting (Gmax), s		* 16	8.3	41.3		7.4	7.3	42.3
Max Q Clear Time (g_c+I1), s		13.5	9.9	43.3		9.3	3.2	22.6
Green Ext Time (p_c), s		0.6	0.0	0.0		0.0	0.0	18.9

Intersection Summary	
HCM 2010 Ctrl Delay	43.6
HCM 2010 LOS	D

Notes

User approved volume balancing among the lanes for turning movement.
* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	402	5	17	18	14	49	19	1229	10	32	1567	702
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.88		1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.99	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1681		1665	1782	1572	1736	3531		1770	3438	1538
Flt Permitted	0.95	1.00		0.95	0.99	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1681		1665	1782	1572	1736	3531		1770	3438	1538
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	467	6	20	21	16	57	22	1429	12	37	1822	816
RTOR Reduction (vph)	0	17	0	0	0	54	0	0	0	0	0	0
Lane Group Flow (vph)	467	9	0	18	19	3	22	1441	0	37	1822	816
Confl. Peds. (#/hr)				1		1			1	1		
Heavy Vehicles (%)	2%	0%	0%	3%	0%	1%	4%	2%	13%	2%	5%	5%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA		Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6						Free
Actuated Green, G (s)	18.9	18.9		6.8	6.8	6.8	4.5	69.6		4.5	70.1	117.7
Effective Green, g (s)	18.9	18.9		6.8	6.8	6.8	4.5	69.6		4.5	70.1	117.7
Actuated g/C Ratio	0.16	0.16		0.06	0.06	0.06	0.04	0.59		0.04	0.60	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)	551	269		96	102	90	66	2088		67	2047	1538
v/s Ratio Prot	c0.14	0.01		0.01	0.01		0.01	0.41		0.02	c0.53	
v/s Ratio Perm						0.00						c0.53
v/c Ratio	0.85	0.03		0.19	0.19	0.04	0.33	0.69		0.55	0.89	0.53
Uniform Delay, d1	48.0	41.7		52.8	52.8	52.4	55.1	16.6		55.6	20.5	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	12.4	0.1		1.6	1.5	0.3	3.0	1.2		9.5	5.7	1.3
Delay (s)	60.4	41.8		54.5	54.3	52.6	58.1	17.8		65.1	26.2	1.3
Level of Service	E	D		D	D	D	E	B		E	C	A
Approach Delay (s)		59.4			53.3			18.5			19.1	
Approach LOS		E			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	23.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	117.7	Sum of lost time (s)	17.9
Intersection Capacity Utilization	69.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM 2010 Signalized Intersection Summary
9: Carmel Rancho Blvd & Shopping Center Dwy

Existing AM.syn
1/27/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	51	1	19	9	1	20	17	200	15	76	498	163
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		1.00	1.00		0.99	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1882	1900	1900	1785	1863	1881	1848	1900	1827	1854	1900
Adj Flow Rate, veh/h	66	1	25	12	1	26	22	260	19	99	647	212
Adj No. of Lanes	1	1	0	0	1	1	1	2	0	1	2	0
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Percent Heavy Veh, %	0	0	0	0	0	2	1	3	3	4	3	3
Cap, veh/h	485	7	177	464	15	180	563	1637	119	835	1285	421
Arrive On Green	0.11	0.11	0.11	0.11	0.11	0.11	0.49	0.49	0.49	0.49	0.49	0.49
Sat Flow, veh/h	1392	62	1545	1084	134	1574	646	3320	241	1072	2606	853
Grp Volume(v), veh/h	66	0	26	13	0	26	22	137	142	99	437	422
Grp Sat Flow(s),veh/h/ln	1392	0	1607	1217	0	1574	646	1756	1805	1072	1761	1698
Q Serve(g_s), s	0.9	0.0	0.3	0.1	0.0	0.3	0.5	0.9	0.9	1.1	3.4	3.4
Cycle Q Clear(g_c), s	1.3	0.0	0.3	0.4	0.0	0.3	3.9	0.9	0.9	2.0	3.4	3.4
Prop In Lane	1.00		0.96	0.92		1.00	1.00		0.13	1.00		0.50
Lane Grp Cap(c), veh/h	485	0	184	479	0	180	563	866	890	835	868	837
V/C Ratio(X)	0.14	0.00	0.14	0.03	0.00	0.14	0.04	0.16	0.16	0.12	0.50	0.50
Avail Cap(c_a), veh/h	1691	0	1575	1644	0	1543	783	1463	1504	1200	1468	1415
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	8.8	0.0	8.1	8.2	0.0	8.1	4.8	2.8	2.8	3.4	3.5	3.5
Incr Delay (d2), s/veh	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.1	0.1	0.0	0.1	0.1	0.4	0.4	0.3	1.6	1.6
LnGrp Delay(d),s/veh	8.8	0.0	8.3	8.2	0.0	8.3	4.8	2.9	2.9	3.4	3.7	3.7
LnGrp LOS	A		A	A		A	A	A	A	A	A	A
Approach Vol, veh/h		92			39			301			958	
Approach Delay, s/veh		8.7			8.2			3.0			3.6	
Approach LOS		A			A			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		6.3		14.1		6.3		14.1
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		20.0		17.0		20.0		17.0
Max Q Clear Time (g_c+I1), s		3.3		5.4		2.4		5.9
Green Ext Time (p_c), s		0.2		4.1		0.2		4.0

Intersection Summary	
HCM 2010 Ctrl Delay	4.0
HCM 2010 LOS	A

HCM Signalized Intersection Capacity Analysis
1: SR 1 & Carmel Valley Rd

Existing PM.syn
1/27/2016

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	0	852	776	88	846	616
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9	4.9	4.9	4.0
Lane Util. Factor		0.88	1.00	1.00	0.97	1.00
Frt		0.85	1.00	0.85	1.00	1.00
Flt Protected		1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		2814	1863	1553	3467	1881
Flt Permitted		1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		2814	1863	1553	3467	1881
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	906	826	94	900	655
RTOR Reduction (vph)	0	171	0	10	0	0
Lane Group Flow (vph)	0	735	826	84	900	655
Heavy Vehicles (%)	0%	1%	2%	4%	1%	1%
Turn Type		Over	NA	Perm	Prot	NA
Protected Phases		3	2		3	Free
Permitted Phases				2		
Actuated Green, G (s)		20.3	31.1	31.1	20.3	61.2
Effective Green, g (s)		20.3	31.1	31.1	20.3	61.2
Actuated g/C Ratio		0.33	0.51	0.51	0.33	1.00
Clearance Time (s)		4.9	4.9	4.9	4.9	
Vehicle Extension (s)		4.5	3.5	3.5	4.5	
Lane Grp Cap (vph)		933	946	789	1150	1881
v/s Ratio Prot		c0.26	c0.44		0.26	0.35
v/s Ratio Perm				0.05		
v/c Ratio		0.79	0.87	0.11	0.78	0.35
Uniform Delay, d1		18.5	13.3	7.8	18.5	0.0
Progression Factor		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		5.0	9.2	0.1	4.0	0.5
Delay (s)		23.5	22.5	7.9	22.4	0.5
Level of Service		C	C	A	C	A
Approach Delay (s)	23.5		21.0			13.2
Approach LOS	C		C			B

Intersection Summary			
HCM 2000 Control Delay	18.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	61.2	Sum of lost time (s)	9.8
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: Carmel Rancho Blvd/Carmel Knolls Dr & Carmel Valley Rd

Existing PM.syn
1/27/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	711	192	300	558	4	276	17	509	4	23	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		0.95	0.95	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	1.00
Satd. Flow (prot)	1805	3539	1615	3467	3571		1715	1729	1599		1887	1553
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	1.00
Satd. Flow (perm)	1805	3539	1615	3467	3571		1715	1729	1599		1887	1553
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	33	756	204	319	594	4	294	18	541	4	24	19
RTOR Reduction (vph)	0	0	138	0	1	0	0	0	458	0	0	19
Lane Group Flow (vph)	33	756	66	319	597	0	156	156	83	0	28	0
Heavy Vehicles (%)	0%	2%	0%	1%	1%	0%	0%	0%	1%	0%	0%	4%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Over	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	7	7	
Permitted Phases			2									7
Actuated Green, G (s)	1.8	19.1	19.1	9.0	26.4		8.9	8.9	9.0		1.5	1.5
Effective Green, g (s)	1.8	19.1	19.1	9.0	26.4		8.9	8.9	9.0		1.5	1.5
Actuated g/C Ratio	0.03	0.32	0.32	0.15	0.45		0.15	0.15	0.15		0.03	0.03
Clearance Time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Vehicle Extension (s)	1.0	1.3	1.3	1.0	1.3		1.0	1.0	1.0		1.0	1.0
Lane Grp Cap (vph)	55	1147	523	529	1600		259	261	244		48	39
v/s Ratio Prot	0.02	c0.21		c0.09	0.17		c0.09	0.09	0.05		c0.01	
v/s Ratio Perm			0.04									0.00
v/c Ratio	0.60	0.66	0.13	0.60	0.37		0.60	0.60	0.34		0.58	0.01
Uniform Delay, d1	28.2	17.1	14.0	23.3	10.8		23.3	23.3	22.3		28.4	28.0
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	11.2	1.1	0.0	1.3	0.1		2.7	2.4	0.3		11.1	0.0
Delay (s)	39.4	18.2	14.1	24.6	10.8		26.0	25.8	22.6		39.5	28.0
Level of Service	D	B	B	C	B		C	C	C		D	C
Approach Delay (s)		18.0			15.6			23.8			34.9	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	19.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	58.9	Sum of lost time (s)	20.4
Intersection Capacity Utilization	66.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM 2010 Signalized Intersection Summary
3: SR 1 & Rio Rd

Existing PM.syn
1/27/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	143	347	83	166	400	294	162	427	155	263	309	44
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1878	1900	1881	1881	1863	1881	1845	1863	1881	1884	1900
Adj Flow Rate, veh/h	146	354	85	169	408	300	165	436	158	268	315	45
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	2	1	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	1	1	1	1	2	1	3	2	1	1	1
Cap, veh/h	169	898	213	203	624	521	199	517	441	359	438	63
Arrive On Green	0.10	0.31	0.31	0.11	0.33	0.33	0.11	0.28	0.28	0.10	0.27	0.27
Sat Flow, veh/h	1774	2862	679	1792	1881	1571	1792	1845	1575	3476	1610	230
Grp Volume(v), veh/h	146	219	220	169	408	300	165	436	158	268	0	360
Grp Sat Flow(s),veh/h/ln	1774	1784	1758	1792	1881	1571	1792	1845	1575	1738	0	1840
Q Serve(g_s), s	7.1	8.4	8.6	8.0	16.1	13.7	7.9	19.4	7.0	6.5	0.0	15.4
Cycle Q Clear(g_c), s	7.1	8.4	8.6	8.0	16.1	13.7	7.9	19.4	7.0	6.5	0.0	15.4
Prop In Lane	1.00		0.39	1.00		1.00	1.00		1.00	1.00		0.13
Lane Grp Cap(c), veh/h	169	559	551	203	624	521	199	517	441	359	0	501
V/C Ratio(X)	0.86	0.39	0.40	0.83	0.65	0.58	0.83	0.84	0.36	0.75	0.00	0.72
Avail Cap(c_a), veh/h	169	559	551	212	624	521	212	572	488	371	0	549
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	38.8	23.4	23.4	37.8	24.8	24.0	37.9	29.5	25.1	37.9	0.0	28.7
Incr Delay (d2), s/veh	34.1	0.5	0.6	22.9	5.3	4.6	22.1	10.6	0.6	7.8	0.0	4.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.0	4.2	4.2	5.3	9.3	6.6	5.1	11.3	3.1	3.5	0.0	8.4
LnGrp Delay(d),s/veh	72.9	23.9	24.0	60.6	30.1	28.6	60.0	40.1	25.7	45.8	0.0	33.0
LnGrp LOS	E	C	C	E	C	C	E	D	C	D		C
Approach Vol, veh/h		585			877			759			628	
Approach Delay, s/veh		36.2			35.5			41.4			38.5	
Approach LOS		D			D			D			D	

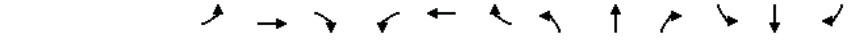
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.6	31.5	13.4	28.6	12.0	33.1	12.7	29.3
Change Period (Y+Rc), s	3.7	* 4.2	3.7	4.9	3.7	* 4.2	3.7	4.9
Max Green Setting (Gmax), s	10.3	* 27	10.3	26.0	8.3	* 29	9.3	27.0
Max Q Clear Time (g_c+I1), s	10.0	10.6	9.9	17.4	9.1	18.1	8.5	21.4
Green Ext Time (p_c), s	0.0	7.3	0.0	3.8	0.0	5.6	0.1	2.8

Intersection Summary	
HCM 2010 Ctrl Delay	37.9
HCM 2010 LOS	D

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	84	459	138	137	438	0	348	0	133	0	0	0
Number	5	2	12	1	6	16	3	8	18			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1900	1867	1900	1881	1881	0	1881	1863	1900			
Adj Flow Rate, veh/h	85	464	139	138	442	0	352	0	134			
Adj No. of Lanes	1	2	0	1	2	0	2	1	0			
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99			
Percent Heavy Veh, %	0	2	2	1	1	0	1	0	1			
Cap, veh/h	108	1400	416	173	1989	0	534	0	243			
Arrive On Green	0.06	0.52	0.52	0.19	1.00	0.00	0.15	0.00	0.15			
Sat Flow, veh/h	1810	2694	801	1792	3668	0	3476	0	1583			
Grp Volume(v), veh/h	85	304	299	138	442	0	352	0	134			
Grp Sat Flow(s),veh/h/ln	1810	1774	1722	1792	1787	0	1738	0	1583			
Q Serve(g_s), s	2.3	5.0	5.0	3.7	0.0	0.0	4.8	0.0	3.9			
Cycle Q Clear(g_c), s	2.3	5.0	5.0	3.7	0.0	0.0	4.8	0.0	3.9			
Prop In Lane	1.00		0.47	1.00		0.00	1.00		1.00			
Lane Grp Cap(c), veh/h	108	921	895	173	1989	0	534	0	243			
V/C Ratio(X)	0.78	0.33	0.33	0.80	0.22	0.00	0.66	0.00	0.55			
Avail Cap(c_a), veh/h	235	921	895	233	1989	0	1112	0	507			
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.87	0.87	0.87	0.99	0.99	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	23.2	7.0	7.0	19.7	0.0	0.0	19.9	0.0	19.6			
Incr Delay (d2), s/veh	4.0	0.8	0.9	9.1	0.3	0.0	0.5	0.0	0.7			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	1.3	2.6	2.5	2.2	0.1	0.0	2.3	0.0	1.8			
LnGrp Delay(d),s/veh	27.2	7.8	7.9	28.8	0.3	0.0	20.4	0.0	20.3			
LnGrp LOS	C	A	A	C	A		C		C			
Approach Vol, veh/h		688			580			486				
Approach Delay, s/veh		10.2			7.0			20.4				
Approach LOS		B			A			C				
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2			5	6		8				
Phs Duration (G+Y+Rc), s	8.3	30.0			6.5	31.8		11.7				
Change Period (Y+Rc), s	3.5	4.0			3.5	4.0		4.0				
Max Green Setting (Gmax), s	6.5	16.0			6.5	16.0		16.0				
Max Q Clear Time (g_c+I1), s	5.7	7.0			4.3	2.0		6.8				
Green Ext Time (p_c), s	0.0	3.4			0.0	4.3		0.9				
Intersection Summary												
HCM 2010 Ctrl Delay			12.0									
HCM 2010 LOS			B									



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	538	54	85	489	0	86	0	110	0	0	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1900	1863	1881	1900	1900	1881	1900	1900	1900	1900
Adj Flow Rate, veh/h	0	555	56	88	504	0	89	0	113	0	0	0
Adj No. of Lanes	0	2	0	1	2	0	0	1	1	0	1	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	0	2	2	2	1	1	0	0	0	0	0	0
Cap, veh/h	0	1948	196	111	2619	0	297	0	173	0	204	0
Arrive On Green	0.00	1.00	1.00	0.06	0.73	0.00	0.11	0.00	0.11	0.00	0.00	0.00
Sat Flow, veh/h	0	3341	327	1774	3668	0	1422	0	1610	0	1900	0
Grp Volume(v), veh/h	0	302	309	88	504	0	89	0	113	0	0	0
Grp Sat Flow(s),veh/h/ln	0	1770	1805	1774	1787	0	1422	0	1610	0	1900	0
Q Serve(g_s), s	0.0	0.0	0.0	2.4	2.2	0.0	3.0	0.0	3.4	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	2.4	2.2	0.0	3.0	0.0	3.4	0.0	0.0	0.0
Prop In Lane	0.00		0.18	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	0	1062	1083	111	2619	0	297	0	173	0	204	0
V/C Ratio(X)	0.00	0.28	0.29	0.79	0.19	0.00	0.30	0.00	0.65	0.00	0.00	0.00
Avail Cap(c_a), veh/h	0	1062	1083	231	2619	0	599	0	515	0	608	0
HCM Platoon Ratio	1.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.94	0.94	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	23.1	2.1	0.0	21.3	0.0	21.4	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.6	0.6	4.6	0.2	0.0	0.2	0.0	1.6	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.2	0.2	1.3	1.1	0.0	1.2	0.0	1.6	0.0	0.0	0.0
LnGrp Delay(d),s/veh	0.0	0.6	0.6	27.7	2.2	0.0	21.5	0.0	23.0	0.0	0.0	0.0
LnGrp LOS		A	A	C	A		C		C			
Approach Vol, veh/h		611			592			202			0	
Approach Delay, s/veh		0.6			6.0			22.3			0.0	
Approach LOS		A			A			C				
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	6.6	34.0		9.4		40.6		9.4				
Change Period (Y+Rc), s	3.5	4.0		4.0		4.0		4.0				
Max Green Setting (Gmax), s	6.5	16.0		16.0		26.0		16.0				
Max Q Clear Time (g_c+I1), s	4.4	2.0		0.0		4.2		5.4				
Green Ext Time (p_c), s	0.0	6.9		0.0		8.9		0.3				
Intersection Summary												
HCM 2010 Ctrl Delay			6.0									
HCM 2010 LOS			A									

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	417	0	62	0	1	0	31	23	0	0	20	418
Conflicting Peds, #/hr	0	0	0	0	0	0	2	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	210	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	92	91	92	92	92	91	91	92	92	91	91
Heavy Vehicles, %	2	0	0	0	0	0	4	0	0	0	0	1
Mvmt Flow	458	0	68	0	1	0	34	25	0	0	22	459

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	2	0	0	14	919	2	16	919	1
Stage 1	-	-	-	-	-	-	2	918	-	1	1	-
Stage 2	-	-	-	-	-	-	12	1	-	15	918	-
Critical Hdwy	4.12	-	-	-	-	-	7.14	6.5	-	7.1	6.5	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.14	5.5	-	-	-	-
Follow-up Hdwy	2.218	-	-	-	-	-	3.536	4	-	3.5	4	3.309
Pot Cap-1 Maneuver	1622	-	-	-	-	-	997	273	-	1004	273	1087
Stage 1	-	-	-	-	-	-	-	-	-	1027	899	-
Stage 2	-	-	-	-	-	-	1003	899	-	-	-	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1622	-	-	-	-	-	548	196	-	-	196	1087
Mov Cap-2 Maneuver	-	-	-	-	-	-	277	~ -739	-	-	~ -71	-
Stage 1	-	-	-	-	-	-	-	-	-	737	899	-
Stage 2	-	-	-	-	-	-	565	899	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	7	0		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	277	-	1622	-	-	-	-	-	-	1087
HCM Lane V/C Ratio	0.123	-	0.283	-	-	-	-	-	-	0.423
HCM Control Delay (s)	19.8	-	8.1	-	-	0	-	-	-	10.7
HCM Lane LOS	C	-	A	-	-	A	-	-	-	B
HCM 95th %tile Q(veh)	0.4	-	1.2	-	-	-	-	-	-	2.1

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	277	22	198	34	13	18	258	1371	10	13	1279	153
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.96	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1869	1900	1863	1763	1900	1900	1845	1900	1900	1881	1881
Adj Flow Rate, veh/h	262	66	208	34	16	19	272	1443	11	14	1346	0
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	7	7	2	5	5	0	3	3	0	1	1
Cap, veh/h	333	73	232	115	46	55	293	1897	14	42	1405	629
Arrive On Green	0.19	0.19	0.19	0.06	0.06	0.06	0.16	0.53	0.53	0.02	0.39	0.00
Sat Flow, veh/h	1774	392	1234	1774	717	852	1810	3566	27	1810	3574	1599
Grp Volume(v), veh/h	262	0	274	34	0	35	272	709	745	14	1346	0
Grp Sat Flow(s),veh/h/ln	1774	0	1626	1774	0	1569	1810	1753	1840	1810	1787	1599
Q Serve(g_s), s	12.4	0.0	14.5	1.6	0.0	1.9	13.1	28.1	28.1	0.7	32.4	0.0
Cycle Q Clear(g_c), s	12.4	0.0	14.5	1.6	0.0	1.9	13.1	28.1	28.1	0.7	32.4	0.0
Prop In Lane	1.00		0.76	1.00		0.54	1.00		0.01	1.00		1.00
Lane Grp Cap(c), veh/h	333	0	305	115	0	102	293	933	979	42	1405	629
V/C Ratio(X)	0.79	0.00	0.90	0.30	0.00	0.34	0.93	0.76	0.76	0.34	0.96	0.00
Avail Cap(c_a), veh/h	334	0	306	141	0	124	293	933	979	150	1421	636
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	34.2	0.0	35.0	39.4	0.0	39.5	36.5	16.2	16.2	42.5	26.1	0.0
Incr Delay (d2), s/veh	12.1	0.0	27.6	2.0	0.0	2.8	34.1	4.1	3.9	4.6	15.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.2	0.0	8.9	0.9	0.0	0.9	9.3	14.5	15.1	0.4	18.8	0.0
LnGrp Delay(d),s/veh	46.3	0.0	62.6	41.4	0.0	42.3	70.6	20.3	20.2	47.1	41.2	0.0
LnGrp LOS	D		E	D		D	E	C	C	D	D	
Approach Vol, veh/h		536			69			1726			1360	
Approach Delay, s/veh		54.6			41.9			28.2			41.3	
Approach LOS		D			D			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.8	18.0	39.6		9.9	5.7	51.9
Change Period (Y+Rc), s		* 4.2	3.7	4.9		4.2	3.7	4.9
Max Green Setting (Gmax), s		* 17	14.3	35.1		7.0	7.3	42.1
Max Q Clear Time (g_c+I1), s		16.5	15.1	34.4		3.9	2.7	30.1
Green Ext Time (p_c), s		0.0	0.0	0.3		0.1	0.0	11.6

Intersection Summary	
HCM 2010 Ctrl Delay	37.1
HCM 2010 LOS	D

Notes

User approved volume balancing among the lanes for turning movement.
* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	982	17	17	23	12	52	13	1619	14	54	1470	745
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1723		1715	1775	1615	1805	3534		1805	3574	1583
Flt Permitted	0.95	1.00		0.95	0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1723		1715	1775	1615	1805	3534		1805	3574	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1023	18	18	24	12	54	14	1686	15	56	1531	776
RTOR Reduction (vph)	0	13	0	0	0	51	0	1	0	0	0	0
Lane Group Flow (vph)	1023	23	0	18	18	3	14	1700	0	56	1531	776
Heavy Vehicles (%)	2%	0%	4%	0%	0%	0%	0%	2%	3%	0%	1%	2%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA		Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6						Free
Actuated Green, G (s)	42.7	42.7		7.0	7.0	7.0	3.1	67.4		6.2	71.0	141.2
Effective Green, g (s)	42.7	42.7		7.0	7.0	7.0	3.1	67.4		6.2	71.0	141.2
Actuated g/C Ratio	0.30	0.30		0.05	0.05	0.05	0.02	0.48		0.04	0.50	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)	1038	521		85	87	80	39	1686		79	1797	1583
v/s Ratio Prot	c0.30	0.01		0.01	0.01		0.01	c0.48		0.03	0.43	
v/s Ratio Perm						0.00						c0.49
v/c Ratio	0.99	0.04		0.21	0.21	0.03	0.36	1.01		0.71	0.85	0.49
Uniform Delay, d1	48.9	34.8		64.5	64.4	63.9	68.1	36.9		66.6	30.5	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	24.3	0.1		2.1	2.0	0.3	5.6	24.0		25.1	4.5	1.1
Delay (s)	73.3	34.9		66.6	66.5	64.2	73.6	60.9		91.7	35.1	1.1
Level of Service	E	C		E	E	E	E	E		F	D	A
Approach Delay (s)		72.0			65.1			61.0			25.2	
Approach LOS		E			E			E			C	

Intersection Summary			
HCM 2000 Control Delay	47.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	141.2	Sum of lost time (s)	17.9
Intersection Capacity Utilization	91.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	171	10	20	40	10	30	38	524	18	11	365	78
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.99	0.99		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1887	1900	1900	1800	1863	1881	1846	1900	1827	1851	1900
Adj Flow Rate, veh/h	184	11	22	43	11	32	41	563	19	12	392	84
Adj No. of Lanes	1	1	0	0	1	1	1	2	0	1	2	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	0	0	0	0	2	1	3	3	4	3	3
Cap, veh/h	628	141	282	541	105	396	592	1359	46	542	1131	240
Arrive On Green	0.25	0.25	0.25	0.25	0.25	0.25	0.39	0.39	0.39	0.39	0.39	0.39
Sat Flow, veh/h	1346	558	1116	1006	418	1568	919	3462	117	810	2883	612
Grp Volume(v), veh/h	184	0	33	54	0	32	41	285	297	12	238	238
Grp Sat Flow(s),veh/h/ln	1346	0	1675	1423	0	1568	919	1754	1825	810	1758	1736
Q Serve(g_s), s	2.7	0.0	0.3	0.0	0.0	0.4	0.7	2.7	2.7	0.2	2.1	2.2
Cycle Q Clear(g_c), s	3.3	0.0	0.3	0.5	0.0	0.4	2.9	2.7	2.7	2.9	2.1	2.2
Prop In Lane	1.00		0.67	0.80		1.00	1.00		0.06	1.00		0.35
Lane Grp Cap(c), veh/h	628	0	423	646	0	396	592	688	716	542	690	681
V/C Ratio(X)	0.29	0.00	0.08	0.08	0.00	0.08	0.07	0.41	0.41	0.02	0.34	0.35
Avail Cap(c_a), veh/h	1484	0	1487	1528	0	1393	925	1324	1377	836	1327	1310
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	7.8	0.0	6.4	6.5	0.0	6.4	5.8	5.0	5.0	6.0	4.8	4.8
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.0	0.2	0.3	0.0	0.2	0.2	1.3	1.3	0.1	1.0	1.0
LnGrp Delay(d),s/veh	7.8	0.0	6.4	6.5	0.0	6.5	5.9	5.1	5.1	6.0	4.9	4.9
LnGrp LOS	A		A	A		A	A	A	A	A	A	A
Approach Vol, veh/h		217			86			623			488	
Approach Delay, s/veh		7.6			6.5			5.2			5.0	
Approach LOS		A			A			A			A	

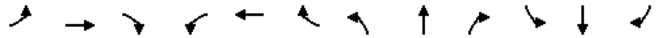
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		9.7		12.8		9.7		12.8
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		20.0		17.0		20.0		17.0
Max Q Clear Time (g_c+I1), s		5.3		4.9		2.5		4.9
Green Ext Time (p_c), s		0.6		3.6		0.6		3.6

Intersection Summary		
HCM 2010 Ctrl Delay	5.5	
HCM 2010 LOS	A	

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	0	733	462	54	1061	694
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9	4.9	4.9	4.0
Lane Util. Factor		0.88	1.00	1.00	0.97	1.00
Frt		0.85	1.00	0.85	1.00	1.00
Flt Protected		1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		2760	1863	1509	3335	1759
Flt Permitted		1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		2760	1863	1509	3335	1759
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	797	502	59	1153	754
RTOR Reduction (vph)	0	256	0	12	0	0
Lane Group Flow (vph)	0	541	502	47	1153	754
Heavy Vehicles (%)	0%	3%	2%	7%	5%	8%
Turn Type		Over	NA	Perm	Prot	NA
Protected Phases		3	2		3	Free
Permitted Phases				2		
Actuated Green, G (s)		25.2	20.7	20.7	25.2	55.7
Effective Green, g (s)		25.2	20.7	20.7	25.2	55.7
Actuated g/C Ratio		0.45	0.37	0.37	0.45	1.00
Clearance Time (s)		4.9	4.9	4.9	4.9	
Vehicle Extension (s)		4.5	3.5	3.5	4.5	
Lane Grp Cap (vph)		1248	692	560	1508	1759
v/s Ratio Prot		0.20	c0.27		c0.35	0.43
v/s Ratio Perm				0.03		
v/c Ratio		0.43	0.73	0.08	0.76	0.43
Uniform Delay, d1		10.4	15.1	11.4	12.8	0.0
Progression Factor		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.4	3.9	0.1	2.7	0.8
Delay (s)		10.8	19.0	11.4	15.4	0.8
Level of Service		B	B	B	B	A
Approach Delay (s)	10.8		18.2			9.6
Approach LOS	B		B			A

Intersection Summary			
HCM 2000 Control Delay	11.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	55.7	Sum of lost time (s)	9.8
Intersection Capacity Utilization	62.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	27	685	403	395	612	5	88	5	259	10	17	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		0.95	0.95	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00	1.00		1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.98	1.00
Satd. Flow (prot)	1736	3374	1563	3467	3501		1618	1641	1524		1681	1560
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.98	1.00
Satd. Flow (perm)	1736	3374	1563	3467	3501		1618	1641	1524		1681	1560
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	31	778	458	449	695	6	100	6	294	11	19	38
RTOR Reduction (vph)	0	0	292	0	1	0	0	0	245	0	0	37
Lane Group Flow (vph)	31	778	166	449	700	0	53	53	49	0	30	1
Confl. Peds. (#/hr)	2		1			1	1			1		2
Heavy Vehicles (%)	4%	7%	2%	1%	3%	0%	6%	0%	6%	30%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Over	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	7	7	
Permitted Phases			2									7
Actuated Green, G (s)	1.8	20.2	20.2	9.3	27.8		4.3	4.3	9.3		1.5	1.5
Effective Green, g (s)	1.8	20.2	20.2	9.3	27.8		4.3	4.3	9.3		1.5	1.5
Actuated g/C Ratio	0.03	0.36	0.36	0.17	0.50		0.08	0.08	0.17		0.03	0.03
Clearance Time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Vehicle Extension (s)	1.0	1.3	1.3	1.0	1.3		1.0	1.0	1.0		1.0	1.0
Lane Grp Cap (vph)	56	1223	566	578	1747		124	126	254		45	42
v/s Ratio Prot	0.02	c0.23		c0.13	0.20		c0.03	0.03	0.03		c0.02	
v/s Ratio Perm			0.11									0.00
v/c Ratio	0.55	0.64	0.29	0.78	0.40		0.43	0.42	0.19		0.67	0.02
Uniform Delay, d1	26.6	14.7	12.7	22.2	8.7		24.5	24.5	20.0		26.9	26.4
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	6.6	0.8	0.1	5.9	0.1		0.9	0.8	0.1		25.2	0.1
Delay (s)	33.1	15.5	12.8	28.1	8.8		25.4	25.3	20.1		52.1	26.5
Level of Service	C	B	B	C	A		C	C	C		D	C
Approach Delay (s)		14.9			16.3			21.5			37.8	
Approach LOS		B			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	17.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	55.7	Sum of lost time (s)	20.4
Intersection Capacity Utilization	52.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	133	222	36	126	179	155	23	228	82	298	355	41
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1842	1900	1863	1810	1827	1759	1827	1863	1827	1820	1900
Adj Flow Rate, veh/h	145	241	39	137	195	168	25	248	89	324	386	45
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	2	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	3	3	2	5	4	8	4	2	4	4	4
Cap, veh/h	215	646	103	212	384	325	76	446	384	502	556	65
Arrive On Green	0.12	0.21	0.21	0.12	0.21	0.21	0.05	0.24	0.24	0.15	0.35	0.35
Sat Flow, veh/h	1774	3023	482	1774	1810	1535	1675	1827	1574	3375	1599	186
Grp Volume(v), veh/h	145	138	142	137	195	168	25	248	89	324	0	431
Grp Sat Flow(s),veh/h/ln	1774	1750	1756	1774	1810	1535	1675	1827	1574	1688	0	1785
Q Serve(g_s), s	4.7	4.1	4.2	4.4	5.7	5.8	0.9	7.2	2.7	5.4	0.0	12.5
Cycle Q Clear(g_c), s	4.7	4.1	4.2	4.4	5.7	5.8	0.9	7.2	2.7	5.4	0.0	12.5
Prop In Lane	1.00		0.27	1.00		1.00	1.00		1.00	1.00		0.10
Lane Grp Cap(c), veh/h	215	374	375	212	384	325	76	446	384	502	0	621
V/C Ratio(X)	0.68	0.37	0.38	0.65	0.51	0.52	0.33	0.56	0.23	0.65	0.00	0.69
Avail Cap(c_a), veh/h	274	810	813	274	838	711	222	788	679	577	0	838
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	25.3	20.2	20.3	25.3	21.0	21.0	27.9	19.9	18.2	24.1	0.0	16.9
Incr Delay (d2), s/veh	4.4	0.7	0.8	3.3	1.3	1.5	2.5	1.3	0.4	2.0	0.0	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	2.0	2.1	2.4	3.0	2.6	0.5	3.7	1.2	2.7	0.0	6.4
LnGrp Delay(d),s/veh	29.8	21.0	21.0	28.6	22.2	22.5	30.4	21.2	18.6	26.2	0.0	18.7
LnGrp LOS	C	C	C	C	C	C	C	C	B	C		B
Approach Vol, veh/h		425			500			362			755	
Approach Delay, s/veh		24.0			24.1			21.2			21.9	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.9	17.1	6.4	25.8	11.0	17.0	12.7	19.6
Change Period (Y+Rc), s	3.7	* 4.2	3.7	4.9	3.7	* 4.2	3.7	4.9
Max Green Setting (Gmax), s	9.3	* 28	8.0	28.3	9.3	* 28	10.3	26.0
Max Q Clear Time (g_c+I1), s	6.4	6.2	2.9	14.5	6.7	7.8	7.4	9.2
Green Ext Time (p_c), s	0.1	4.3	0.0	4.2	0.1	4.2	0.3	4.6

Intersection Summary		
HCM 2010 Ctrl Delay		22.8
HCM 2010 LOS		C

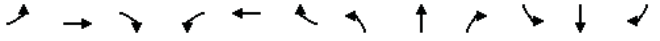
Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	53	390	83	87	271	0	140	0	69	0	0	0
Number	5	2	12	1	6	16	3	8	18			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1900	1860	1900	1810	1792	0	1810	1696	1900			
Adj Flow Rate, veh/h	58	429	91	96	298	0	154	0	76			
Adj No. of Lanes	1	2	0	1	2	0	2	1	0			
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91			
Percent Heavy Veh, %	0	2	2	5	6	0	5	0	5			
Cap, veh/h	80	1760	370	119	2148	0	317	0	137			
Arrive On Green	0.04	0.61	0.61	0.14	1.00	0.00	0.09	0.00	0.09			
Sat Flow, veh/h	1810	2905	611	1723	3495	0	3343	0	1442			
Grp Volume(v), veh/h	58	260	260	96	298	0	154	0	76			
Grp Sat Flow(s),veh/h/ln	1810	1767	1750	1723	1703	0	1672	0	1442			
Q Serve(g_s), s	1.6	3.4	3.4	2.7	0.0	0.0	2.2	0.0	2.5			
Cycle Q Clear(g_c), s	1.6	3.4	3.4	2.7	0.0	0.0	2.2	0.0	2.5			
Prop In Lane	1.00		0.35	1.00		0.00	1.00		1.00			
Lane Grp Cap(c), veh/h	80	1070	1060	119	2148	0	317	0	137			
V/C Ratio(X)	0.72	0.24	0.25	0.80	0.14	0.00	0.49	0.00	0.56			
Avail Cap(c_a), veh/h	199	1070	1060	224	2148	0	1070	0	461			
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.88	0.88	0.88	1.00	1.00	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	23.6	4.6	4.6	21.2	0.0	0.0	21.5	0.0	21.6			
Incr Delay (d2), s/veh	4.0	0.5	0.5	4.7	0.1	0.0	0.4	0.0	1.3			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.9	1.8	1.8	1.4	0.0	0.0	1.0	0.0	1.0			
LnGrp Delay(d),s/veh	27.6	5.0	5.0	25.9	0.1	0.0	21.9	0.0	22.9			
LnGrp LOS	C	A	A	C	A		C		C			
Approach Vol, veh/h		578			394			230				
Approach Delay, s/veh		7.3			6.4			22.2				
Approach LOS		A			A			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	7.0	34.3			5.7	35.5		8.7
Change Period (Y+Rc), s	3.5	4.0			3.5	4.0		4.0
Max Green Setting (Gmax), s	6.5	16.0			5.5	17.0		16.0
Max Q Clear Time (g_c+I1), s	4.7	5.4			3.6	2.0		4.5
Green Ext Time (p_c), s	0.0	2.8			0.0	3.3		0.4

Intersection Summary		
HCM 2010 Ctrl Delay		9.9
HCM 2010 LOS		A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	367	92	62	326	1	32	0	38	0	0	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	0.99		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1820	1900	1845	1845	1900	1900	1638	1712	1900	1900	1900
Adj Flow Rate, veh/h	0	442	111	75	393	1	39	0	46	0	0	0
Adj No. of Lanes	0	2	0	1	2	0	0	1	1	0	1	0
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	0	4	4	3	3	3	0	0	11	0	0	0
Cap, veh/h	0	1814	452	94	2814	7	212	0	80	0	105	0
Arrive On Green	0.00	0.22	0.22	0.05	0.78	0.78	0.06	0.00	0.06	0.00	0.00	0.00
Sat Flow, veh/h	0	2834	684	1757	3587	9	1228	0	1444	0	1900	0
Grp Volume(v), veh/h	0	277	276	75	192	202	39	0	46	0	0	0
Grp Sat Flow(s),veh/h/ln	0	1729	1698	1757	1753	1843	1228	0	1444	0	1900	0
Q Serve(g_s), s	0.0	6.6	6.7	2.1	1.3	1.3	1.5	0.0	1.6	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	6.6	6.7	2.1	1.3	1.3	1.5	0.0	1.6	0.0	0.0	0.0
Prop In Lane	0.00		0.40	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	0	1143	1123	94	1375	1446	212	0	80	0	105	0
V/C Ratio(X)	0.00	0.24	0.25	0.80	0.14	0.14	0.18	0.00	0.57	0.00	0.00	0.00
Avail Cap(c_a), veh/h	0	1143	1123	193	1375	1446	537	0	462	0	608	0
HCM Platoon Ratio	1.00	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.98	0.98	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	9.2	9.2	23.4	1.3	1.3	23.0	0.0	23.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.5	0.5	5.8	0.2	0.2	0.2	0.0	2.4	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.3	3.3	1.2	0.7	0.8	0.5	0.0	0.7	0.0	0.0	0.0
LnGrp Delay(d),s/veh	0.0	9.7	9.8	29.2	1.5	1.5	23.2	0.0	25.4	0.0	0.0	0.0
LnGrp LOS		A	A	C	A	A	C		C			
Approach Vol, veh/h		553			469			85			0	
Approach Delay, s/veh		9.7			5.9			24.4			0.0	
Approach LOS		A			A			C				
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	6.2	37.1		6.8		43.2		6.8				
Change Period (Y+Rc), s	3.5	4.0		4.0		4.0		4.0				
Max Green Setting (Gmax), s	5.5	17.0		16.0		26.0		16.0				
Max Q Clear Time (g_c+I1), s	4.1	8.7		0.0		3.3		3.6				
Green Ext Time (p_c), s	0.0	4.0		0.0		7.0		0.1				
Intersection Summary												
HCM 2010 Ctrl Delay			9.3									
HCM 2010 LOS			A									

Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	218	0	18	0	1	0	27	19	0	0	34	307
Conflicting Peds, #/hr	2	0	2	0	0	0	2	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	210	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	1	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	92	80	92	92	92	80	80	92	92	80	80
Heavy Vehicles, %	7	0	0	2	2	2	0	7	0	0	0	2
Mvmt Flow	272	0	22	0	1	0	34	24	0	0	42	384

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	3	0	0	2	0	0	26	550	2	17	550	5
Stage 1	-	-	-	-	-	-	2	547	-	3	3	-
Stage 2	-	-	-	-	-	-	24	3	-	14	547	-
Critical Hdwy	4.17	-	-	-	-	-	7.1	6.57	-	7.1	6.5	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.57	-	-	-	-
Follow-up Hdwy	2.263	-	-	-	-	-	3.5	4.063	-	3.5	4	3.318
Pot Cap-1 Maneuver	1587	-	-	-	-	-	990	436	-	1003	446	1078
Stage 1	-	-	-	-	-	-	-	-	-	1025	897	-
Stage 2	-	-	-	-	-	-	999	883	-	-	-	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1584	-	-	-	-	-	572	360	-	-	368	1074
Mov Cap-2 Maneuver	-	-	-	-	-	-	370	1061	-	-	~ -783	-
Stage 1	-	-	-	-	-	-	-	-	-	847	896	-
Stage 2	-	-	-	-	-	-	611	882	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	7.2	0		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	370	-	1584	-	-	-	-	-	-	1074
HCM Lane V/C Ratio	0.091	-	0.172	-	-	-	-	-	-	0.357
HCM Control Delay (s)	15.7	-	7.7	-	-	0	-	-	-	10.2
HCM Lane LOS	C	-	A	-	-	A	-	-	-	B
HCM 95th %tile Q(veh)	0.3	-	0.6	-	-	-	-	-	-	1.6

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	213	40	114	134	38	50	138	996	37	16	1428	137
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.94	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1869	1900	1900	1842	1900	1827	1839	1900	1357	1827	1845
Adj Flow Rate, veh/h	211	94	131	128	81	57	159	1145	43	18	1641	0
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	3	0	0	0	9	9	4	3	3	40	4	3
Cap, veh/h	288	114	159	151	82	57	163	1826	69	37	1619	731
Arrive On Green	0.16	0.16	0.16	0.08	0.08	0.08	0.09	0.53	0.53	0.03	0.47	0.00
Sat Flow, veh/h	1757	694	967	1810	977	688	1740	3433	129	1293	3471	1568
Grp Volume(v), veh/h	211	0	225	128	0	138	159	583	605	18	1641	0
Grp Sat Flow(s),veh/h/ln	1757	0	1661	1810	0	1665	1740	1748	1814	1293	1736	1568
Q Serve(g_s), s	10.1	0.0	11.6	6.2	0.0	7.3	8.1	20.7	20.8	1.2	41.3	0.0
Cycle Q Clear(g_c), s	10.1	0.0	11.6	6.2	0.0	7.3	8.1	20.7	20.8	1.2	41.3	0.0
Prop In Lane	1.00		0.58	1.00		0.41	1.00		0.07	1.00		1.00
Lane Grp Cap(c), veh/h	288	0	273	151	0	139	163	930	965	37	1619	731
V/C Ratio(X)	0.73	0.00	0.82	0.85	0.00	0.99	0.97	0.63	0.63	0.49	1.01	0.00
Avail Cap(c_a), veh/h	317	0	300	151	0	139	163	930	965	107	1619	731
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	35.1	0.0	35.8	40.0	0.0	40.5	40.0	14.5	14.6	42.4	23.6	0.0
Incr Delay (d2), s/veh	8.0	0.0	16.2	34.4	0.0	73.7	62.7	1.7	1.7	9.9	25.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.5	0.0	6.5	4.5	0.0	6.2	6.7	10.3	10.7	0.5	25.4	0.0
LnGrp Delay(d),s/veh	43.2	0.0	52.0	74.5	0.0	114.2	102.8	16.3	16.2	52.3	49.4	0.0
LnGrp LOS	D		D	E		F	F	B	B	D	F	
Approach Vol, veh/h		436			266			1347			1659	
Approach Delay, s/veh		47.7			95.1			26.4			49.4	
Approach LOS		D			F			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		18.7	12.0	46.2		11.6	6.2	52.0
Change Period (Y+Rc), s		* 4.2	3.7	4.9		4.2	3.7	4.9
Max Green Setting (Gmax), s		* 16	8.3	41.3		7.4	7.3	42.3
Max Q Clear Time (g_c+I1), s		13.6	10.1	43.3		9.3	3.2	22.8
Green Ext Time (p_c), s		0.6	0.0	0.0		0.0	0.0	18.7

Intersection Summary	
HCM 2010 Ctrl Delay	44.1
HCM 2010 LOS	D

Notes

User approved volume balancing among the lanes for turning movement.
* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	402	5	17	18	14	49	19	1234	10	32	1569	702
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.88		1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.99	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1681		1665	1782	1572	1736	3531		1770	3438	1538
Flt Permitted	0.95	1.00		0.95	0.99	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1681		1665	1782	1572	1736	3531		1770	3438	1538
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	467	6	20	21	16	57	22	1435	12	37	1824	816
RTOR Reduction (vph)	0	17	0	0	0	54	0	0	0	0	0	0
Lane Group Flow (vph)	467	9	0	18	19	3	22	1447	0	37	1824	816
Confl. Peds. (#/hr)				1		1			1	1		
Heavy Vehicles (%)	2%	0%	0%	3%	0%	1%	4%	2%	13%	2%	5%	5%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA		Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6						Free
Actuated Green, G (s)	18.9	18.9		6.8	6.8	6.8	4.5	69.6		4.5	70.1	117.7
Effective Green, g (s)	18.9	18.9		6.8	6.8	6.8	4.5	69.6		4.5	70.1	117.7
Actuated g/C Ratio	0.16	0.16		0.06	0.06	0.06	0.04	0.59		0.04	0.60	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)	551	269		96	102	90	66	2088		67	2047	1538
v/s Ratio Prot	c0.14	0.01		0.01	0.01		0.01	0.41		0.02	c0.53	
v/s Ratio Perm						0.00						c0.53
v/c Ratio	0.85	0.03		0.19	0.19	0.04	0.33	0.69		0.55	0.89	0.53
Uniform Delay, d1	48.0	41.7		52.8	52.8	52.4	55.1	16.6		55.6	20.5	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	12.4	0.1		1.6	1.5	0.3	3.0	1.3		9.5	5.7	1.3
Delay (s)	60.4	41.8		54.5	54.3	52.6	58.1	17.9		65.1	26.2	1.3
Level of Service	E	D		D	D	D	E	B		E	C	A
Approach Delay (s)		59.4			53.3			18.5			19.2	
Approach LOS		E			D			B			B	

Intersection Summary					
HCM 2000 Control Delay	23.8	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.89				
Actuated Cycle Length (s)	117.7	Sum of lost time (s)	17.9		
Intersection Capacity Utilization	69.4%	ICU Level of Service	C		
Analysis Period (min)	15				
c Critical Lane Group					

HCM 2010 Signalized Intersection Summary
9: Carmel Rancho Blvd & Shopping Center Dwy

Existing + Proj AM.syn
1/27/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	51	1	19	9	1	20	18	204	15	76	501	163
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		1.00	1.00		0.99	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1882	1900	1900	1785	1863	1881	1848	1900	1827	1854	1900
Adj Flow Rate, veh/h	66	1	25	12	1	26	23	265	19	99	651	212
Adj No. of Lanes	1	1	0	0	1	1	1	2	0	1	2	0
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Percent Heavy Veh, %	0	0	0	0	0	2	1	3	3	4	3	3
Cap, veh/h	484	7	177	462	16	180	562	1645	117	833	1292	420
Arrive On Green	0.11	0.11	0.11	0.11	0.11	0.11	0.49	0.49	0.49	0.49	0.49	0.49
Sat Flow, veh/h	1392	62	1545	1084	137	1574	644	3324	237	1067	2610	849
Grp Volume(v), veh/h	66	0	26	13	0	26	23	139	145	99	439	424
Grp Sat Flow(s),veh/h/ln	1392	0	1607	1221	0	1574	644	1756	1805	1067	1761	1699
Q Serve(g_s), s	0.9	0.0	0.3	0.1	0.0	0.3	0.5	0.9	0.9	1.2	3.4	3.4
Cycle Q Clear(g_c), s	1.3	0.0	0.3	0.4	0.0	0.3	4.0	0.9	0.9	2.1	3.4	3.4
Prop In Lane	1.00		0.96	0.92		1.00	1.00		0.13	1.00		0.50
Lane Grp Cap(c), veh/h	484	0	184	478	0	180	562	869	893	833	871	841
V/C Ratio(X)	0.14	0.00	0.14	0.03	0.00	0.14	0.04	0.16	0.16	0.12	0.50	0.50
Avail Cap(c_a), veh/h	1684	0	1569	1638	0	1537	778	1458	1499	1190	1462	1410
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	8.8	0.0	8.2	8.2	0.0	8.2	4.8	2.8	2.8	3.4	3.5	3.5
Incr Delay (d2), s/veh	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.1	0.1	0.0	0.1	0.1	0.4	0.5	0.3	1.6	1.6
LnGrp Delay(d),s/veh	8.8	0.0	8.3	8.2	0.0	8.3	4.8	2.9	2.9	3.4	3.6	3.7
LnGrp LOS	A		A	A		A	A	A	A	A	A	A
Approach Vol, veh/h		92			39			307			962	
Approach Delay, s/veh		8.7			8.3			3.0			3.6	
Approach LOS		A			A			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		6.3		14.1		6.3		14.1
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		20.0		17.0		20.0		17.0
Max Q Clear Time (g_c+I1), s		3.3		5.4		2.4		6.0
Green Ext Time (p_c), s		0.2		4.1		0.2		4.0

Intersection Summary		
HCM 2010 Ctrl Delay		4.0
HCM 2010 LOS		A

HCM Signalized Intersection Capacity Analysis
1: SR 1 & Carmel Valley Rd

Existing + Proj PM.syn
1/27/2016

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	0	853	780	88	848	621
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9	4.9	4.9	4.0
Lane Util. Factor		0.88	1.00	1.00	0.97	1.00
Frt		0.85	1.00	0.85	1.00	1.00
Flt Protected		1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		2814	1863	1553	3467	1881
Flt Permitted		1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		2814	1863	1553	3467	1881
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	907	830	94	902	661
RTOR Reduction (vph)	0	170	0	10	0	0
Lane Group Flow (vph)	0	737	830	84	902	661
Heavy Vehicles (%)	0%	1%	2%	4%	1%	1%
Turn Type		Over	NA	Perm	Prot	NA
Protected Phases		3	2		3	Free
Permitted Phases				2		
Actuated Green, G (s)		20.3	31.1	31.1	20.3	61.2
Effective Green, g (s)		20.3	31.1	31.1	20.3	61.2
Actuated g/C Ratio		0.33	0.51	0.51	0.33	1.00
Clearance Time (s)		4.9	4.9	4.9	4.9	
Vehicle Extension (s)		4.5	3.5	3.5	4.5	
Lane Grp Cap (vph)		933	946	789	1150	1881
v/s Ratio Prot		c0.26	c0.45		0.26	0.35
v/s Ratio Perm				0.05		
v/c Ratio		0.79	0.88	0.11	0.78	0.35
Uniform Delay, d1		18.5	13.4	7.8	18.5	0.0
Progression Factor		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		5.1	9.4	0.1	4.0	0.5
Delay (s)		23.7	22.8	7.9	22.5	0.5
Level of Service		C	C	A	C	A
Approach Delay (s)	23.7		21.3			13.2
Approach LOS	C		C			B

Intersection Summary				
HCM 2000 Control Delay		18.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio		0.84		
Actuated Cycle Length (s)		61.2	Sum of lost time (s)	9.8
Intersection Capacity Utilization		79.1%	ICU Level of Service	D
Analysis Period (min)		15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	711	194	303	558	4	277	17	511	4	23	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		0.95	0.95	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	1.00
Satd. Flow (prot)	1805	3539	1615	3467	3571		1715	1728	1599		1887	1553
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	1.00
Satd. Flow (perm)	1805	3539	1615	3467	3571		1715	1728	1599		1887	1553
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	33	756	206	322	594	4	295	18	544	4	24	19
RTOR Reduction (vph)	0	0	139	0	1	0	0	0	460	0	0	19
Lane Group Flow (vph)	33	756	67	322	597	0	156	157	84	0	28	0
Heavy Vehicles (%)	0%	2%	0%	1%	1%	0%	0%	0%	1%	0%	0%	4%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Over	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	7	7	
Permitted Phases			2									7
Actuated Green, G (s)	1.8	19.1	19.1	9.1	26.5		8.9	8.9	9.1		1.5	1.5
Effective Green, g (s)	1.8	19.1	19.1	9.1	26.5		8.9	8.9	9.1		1.5	1.5
Actuated g/C Ratio	0.03	0.32	0.32	0.15	0.45		0.15	0.15	0.15		0.03	0.03
Clearance Time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Vehicle Extension (s)	1.0	1.3	1.3	1.0	1.3		1.0	1.0	1.0		1.0	1.0
Lane Grp Cap (vph)	55	1145	522	534	1603		258	260	246		47	39
v/s Ratio Prot	0.02	c0.21		c0.09	0.17		c0.09	0.09	0.05		c0.01	
v/s Ratio Perm			0.04									0.00
v/c Ratio	0.60	0.66	0.13	0.60	0.37		0.60	0.60	0.34		0.60	0.01
Uniform Delay, d1	28.2	17.2	14.1	23.3	10.8		23.4	23.4	22.3		28.4	28.0
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	11.2	1.1	0.0	1.3	0.1		2.7	2.7	0.3		12.8	0.0
Delay (s)	39.4	18.3	14.1	24.6	10.8		26.1	26.1	22.6		41.2	28.1
Level of Service	D	B	B	C	B		C	C	C		D	C
Approach Delay (s)		18.1			15.6			23.9			35.9	
Approach LOS		B			B			C			D	

Intersection Summary				
HCM 2000 Control Delay	19.4	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.63			
Actuated Cycle Length (s)	59.0	Sum of lost time (s)	20.4	
Intersection Capacity Utilization	66.8%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	143	350	83	167	402	298	162	427	157	268	309	44
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1878	1900	1881	1881	1863	1881	1845	1863	1881	1884	1900
Adj Flow Rate, veh/h	146	357	85	170	410	304	165	436	160	273	315	45
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	2	1	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	1	1	1	1	2	1	3	2	1	1	1
Cap, veh/h	169	898	211	204	624	521	199	517	441	359	438	63
Arrive On Green	0.10	0.31	0.31	0.11	0.33	0.33	0.11	0.28	0.28	0.10	0.27	0.27
Sat Flow, veh/h	1774	2868	675	1792	1881	1571	1792	1845	1575	3476	1610	230
Grp Volume(v), veh/h	146	220	222	170	410	304	165	436	160	273	0	360
Grp Sat Flow(s),veh/h/ln	1774	1784	1759	1792	1881	1571	1792	1845	1575	1738	0	1840
Q Serve(g_s), s	7.1	8.4	8.6	8.1	16.2	14.0	7.9	19.4	7.1	6.7	0.0	15.4
Cycle Q Clear(g_c), s	7.1	8.4	8.6	8.1	16.2	14.0	7.9	19.4	7.1	6.7	0.0	15.4
Prop In Lane	1.00		0.38	1.00		1.00	1.00		1.00	1.00		0.13
Lane Grp Cap(c), veh/h	169	558	551	204	624	521	199	517	441	359	0	501
V/C Ratio(X)	0.86	0.39	0.40	0.83	0.66	0.58	0.83	0.84	0.36	0.76	0.00	0.72
Avail Cap(c_a), veh/h	169	558	551	212	624	521	212	572	488	371	0	549
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	38.8	23.4	23.5	37.8	24.9	24.1	37.9	29.5	25.1	38.0	0.0	28.7
Incr Delay (d2), s/veh	34.1	0.5	0.6	23.1	5.3	4.7	22.1	10.6	0.6	8.7	0.0	4.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.0	4.2	4.3	5.3	9.4	6.7	5.1	11.3	3.1	3.6	0.0	8.4
LnGrp Delay(d),s/veh	72.9	24.0	24.1	60.8	30.2	28.8	60.0	40.1	25.7	46.7	0.0	33.0
LnGrp LOS	E	C	C	E	C	C	E	D	C	D		C
Approach Vol, veh/h		588			884			761			633	
Approach Delay, s/veh		36.2			35.6			41.4			38.9	
Approach LOS		D			D			D			D	

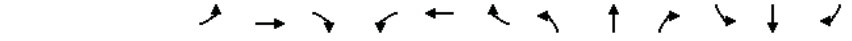
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.6	31.5	13.4	28.6	12.0	33.1	12.7	29.3
Change Period (Y+Rc), s	3.7	* 4.2	3.7	4.9	3.7	* 4.2	3.7	4.9
Max Green Setting (Gmax), s	10.3	* 27	10.3	26.0	8.3	* 29	9.3	27.0
Max Q Clear Time (g_c+I1), s	10.1	10.6	9.9	17.4	9.1	18.2	8.7	21.4
Green Ext Time (p_c), s	0.0	7.3	0.0	3.8	0.0	5.6	0.1	2.8

Intersection Summary	
HCM 2010 Ctrl Delay	38.0
HCM 2010 LOS	D

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	84	469	138	137	445	0	348	0	134	0	0	0
Number	5	2	12	1	6	16	3	8	18			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1900	1867	1900	1881	1881	0	1881	1863	1900			
Adj Flow Rate, veh/h	85	474	139	138	449	0	352	0	135			
Adj No. of Lanes	1	2	0	1	2	0	2	1	0			
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99			
Percent Heavy Veh, %	0	2	2	1	1	0	1	0	1			
Cap, veh/h	108	1407	410	173	1989	0	534	0	243			
Arrive On Green	0.06	0.52	0.52	0.19	1.00	0.00	0.15	0.00	0.15			
Sat Flow, veh/h	1810	2709	789	1792	3668	0	3476	0	1583			
Grp Volume(v), veh/h	85	309	304	138	449	0	352	0	135			
Grp Sat Flow(s),veh/h/ln	1810	1774	1724	1792	1787	0	1738	0	1583			
Q Serve(g_s), s	2.3	5.1	5.1	3.7	0.0	0.0	4.8	0.0	3.9			
Cycle Q Clear(g_c), s	2.3	5.1	5.1	3.7	0.0	0.0	4.8	0.0	3.9			
Prop In Lane	1.00		0.46	1.00		0.00	1.00		1.00			
Lane Grp Cap(c), veh/h	108	921	896	173	1989	0	534	0	243			
V/C Ratio(X)	0.78	0.34	0.34	0.80	0.23	0.00	0.66	0.00	0.55			
Avail Cap(c_a), veh/h	235	921	896	233	1989	0	1112	0	507			
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.87	0.87	0.87	0.99	0.99	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	23.2	7.0	7.0	19.7	0.0	0.0	19.9	0.0	19.6			
Incr Delay (d2), s/veh	4.0	0.9	0.9	9.1	0.3	0.0	0.5	0.0	0.7			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	1.3	2.6	2.7	2.2	0.1	0.0	2.3	0.0	1.8			
LnGrp Delay(d),s/veh	27.2	7.8	7.9	28.8	0.3	0.0	20.4	0.0	20.3			
LnGrp LOS	C	A	A	C	A		C		C			
Approach Vol, veh/h		698			587			487				
Approach Delay, s/veh		10.2			7.0			20.4				
Approach LOS		B			A			C				
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2			5	6		8				
Phs Duration (G+Y+Rc), s	8.3	30.0			6.5	31.8		11.7				
Change Period (Y+Rc), s	3.5	4.0			3.5	4.0		4.0				
Max Green Setting (Gmax), s	6.5	16.0			6.5	16.0		16.0				
Max Q Clear Time (g_c+I1), s	5.7	7.1			4.3	2.0		6.8				
Green Ext Time (p_c), s	0.0	3.4			0.0	4.4		0.9				
Intersection Summary												
HCM 2010 Ctrl Delay			11.9									
HCM 2010 LOS			B									



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	549	54	85	496	0	86	0	111	0	0	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1900	1863	1881	1900	1900	1881	1900	1900	1900	1900
Adj Flow Rate, veh/h	0	566	56	88	511	0	89	0	114	0	0	0
Adj No. of Lanes	0	2	0	1	2	0	0	1	1	0	1	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	0	2	2	2	1	1	0	0	0	0	0	0
Cap, veh/h	0	1950	193	111	2617	0	297	0	174	0	205	0
Arrive On Green	0.00	1.00	1.00	0.06	0.73	0.00	0.11	0.00	0.11	0.00	0.00	0.00
Sat Flow, veh/h	0	3347	321	1774	3668	0	1422	0	1611	0	1900	0
Grp Volume(v), veh/h	0	307	315	88	511	0	89	0	114	0	0	0
Grp Sat Flow(s),veh/h/ln	0	1770	1806	1774	1787	0	1422	0	1611	0	1900	0
Q Serve(g_s), s	0.0	0.0	0.0	2.4	2.2	0.0	3.0	0.0	3.4	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	2.4	2.2	0.0	3.0	0.0	3.4	0.0	0.0	0.0
Prop In Lane	0.00		0.18	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	0	1060	1082	111	2617	0	297	0	174	0	205	0
V/C Ratio(X)	0.00	0.29	0.29	0.79	0.20	0.00	0.30	0.00	0.66	0.00	0.00	0.00
Avail Cap(c_a), veh/h	0	1060	1082	231	2617	0	599	0	515	0	608	0
HCM Platoon Ratio	1.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.93	0.93	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	23.1	2.1	0.0	21.2	0.0	21.4	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.6	0.6	4.6	0.2	0.0	0.2	0.0	1.6	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.2	0.2	1.3	1.1	0.0	1.2	0.0	1.6	0.0	0.0	0.0
LnGrp Delay(d),s/veh	0.0	0.6	0.6	27.7	2.3	0.0	21.4	0.0	23.0	0.0	0.0	0.0
LnGrp LOS		A	A	C	A		C		C			
Approach Vol, veh/h		622			599			203			0	
Approach Delay, s/veh		0.6			6.0			22.3			0.0	
Approach LOS		A			A			C				
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	6.6	34.0		9.4		40.6		9.4				
Change Period (Y+Rc), s	3.5	4.0		4.0		4.0		4.0				
Max Green Setting (Gmax), s	6.5	16.0		16.0		26.0		16.0				
Max Q Clear Time (g_c+I1), s	4.4	2.0		0.0		4.2		5.4				
Green Ext Time (p_c), s	0.0	7.0		0.0		9.0		0.3				
Intersection Summary												
HCM 2010 Ctrl Delay			6.0									
HCM 2010 LOS			A									

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	417	0	74	0	1	0	38	27	0	0	27	418
Conflicting Peds, #/hr	0	0	0	0	0	0	2	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	210	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	92	91	92	92	92	91	91	92	92	91	91
Heavy Vehicles, %	2	0	0	0	0	0	4	0	0	0	0	1
Mvmt Flow	458	0	81	0	1	0	42	30	0	0	30	459

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	2	0	0	18	919	2	18	919	1
Stage 1	-	-	-	-	-	-	2	918	-	1	1	-
Stage 2	-	-	-	-	-	-	16	1	-	17	918	-
Critical Hdwy	4.12	-	-	-	-	-	7.14	6.5	-	7.1	6.5	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.14	5.5	-	-	-	-
Follow-up Hdwy	2.218	-	-	-	-	-	3.536	4	-	3.5	4	3.309
Pot Cap-1 Maneuver	1622	-	-	-	-	-	991	273	-	1001	273	1087
Stage 1	-	-	-	-	-	-	-	-	-	1027	899	-
Stage 2	-	-	-	-	-	-	998	899	-	-	-	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1622	-	-	-	-	-	579	196	-	-	196	1087
Mov Cap-2 Maneuver	-	-	-	-	-	-	289	~ -739	-	-	~ -71	-
Stage 1	-	-	-	-	-	-	-	-	-	737	899	-
Stage 2	-	-	-	-	-	-	557	899	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	6.9	0		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	289	-	1622	-	-	-	-	-	-	1087
HCM Lane V/C Ratio	0.144	-	0.283	-	-	-	-	-	-	0.423
HCM Control Delay (s)	19.5	-	8.1	-	-	0	-	-	-	10.7
HCM Lane LOS	C	-	A	-	-	A	-	-	-	B
HCM 95th %tile Q(veh)	0.5	-	1.2	-	-	-	-	-	-	2.1

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	277	22	200	34	13	18	259	1375	10	13	1284	153
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.96	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1869	1900	1863	1763	1900	1900	1845	1900	1900	1881	1881
Adj Flow Rate, veh/h	263	64	211	34	16	19	273	1447	11	14	1352	0
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	7	7	2	5	5	0	3	3	0	1	1
Cap, veh/h	333	71	234	115	46	55	293	1899	14	42	1408	630
Arrive On Green	0.19	0.19	0.19	0.06	0.06	0.06	0.16	0.53	0.53	0.02	0.39	0.00
Sat Flow, veh/h	1774	378	1246	1774	717	852	1810	3566	27	1810	3574	1599
Grp Volume(v), veh/h	263	0	275	34	0	35	273	711	747	14	1352	0
Grp Sat Flow(s),veh/h/ln	1774	0	1623	1774	0	1569	1810	1753	1840	1810	1787	1599
Q Serve(g_s), s	12.5	0.0	14.7	1.6	0.0	1.9	13.2	28.2	28.3	0.7	32.6	0.0
Cycle Q Clear(g_c), s	12.5	0.0	14.7	1.6	0.0	1.9	13.2	28.2	28.3	0.7	32.6	0.0
Prop In Lane	1.00		0.77	1.00		0.54	1.00		0.01	1.00		1.00
Lane Grp Cap(c), veh/h	333	0	305	115	0	101	293	933	980	42	1408	630
V/C Ratio(X)	0.79	0.00	0.90	0.30	0.00	0.35	0.93	0.76	0.76	0.34	0.96	0.00
Avail Cap(c_a), veh/h	333	0	305	140	0	124	293	933	980	149	1418	634
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	34.3	0.0	35.1	39.5	0.0	39.6	36.6	16.3	16.3	42.5	26.1	0.0
Incr Delay (d2), s/veh	12.4	0.0	28.4	2.0	0.0	2.9	35.4	4.2	4.0	4.6	15.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.3	0.0	9.0	0.9	0.0	0.9	9.5	14.5	15.4	0.4	19.0	0.0
LnGrp Delay(d),s/veh	46.7	0.0	63.6	41.5	0.0	42.4	72.0	20.4	20.3	47.2	41.7	0.0
LnGrp LOS	D		E	D		D	E	C	C	D	D	
Approach Vol, veh/h		538			69			1731			1366	
Approach Delay, s/veh		55.3			42.0			28.5			41.8	
Approach LOS		E			D			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.8	18.0	39.7		9.9	5.7	52.0
Change Period (Y+Rc), s		* 4.2	3.7	4.9		4.2	3.7	4.9
Max Green Setting (Gmax), s		* 17	14.3	35.1		7.0	7.3	42.1
Max Q Clear Time (g_c+I1), s		16.7	15.2	34.6		3.9	2.7	30.3
Green Ext Time (p_c), s		0.0	0.0	0.2		0.1	0.0	11.5

Intersection Summary	
HCM 2010 Ctrl Delay	37.5
HCM 2010 LOS	D

Notes

User approved volume balancing among the lanes for turning movement.
* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	982	17	17	23	12	52	13	1623	14	54	1475	745
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1723		1715	1775	1615	1805	3534		1805	3574	1583
Flt Permitted	0.95	1.00		0.95	0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1723		1715	1775	1615	1805	3534		1805	3574	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1023	18	18	24	12	54	14	1691	15	56	1536	776
RTOR Reduction (vph)	0	13	0	0	0	51	0	1	0	0	0	0
Lane Group Flow (vph)	1023	23	0	18	18	3	14	1705	0	56	1536	776
Heavy Vehicles (%)	2%	0%	4%	0%	0%	0%	0%	2%	3%	0%	1%	2%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA		Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6						Free
Actuated Green, G (s)	42.7	42.7		7.0	7.0	7.0	3.1	67.4		6.2	71.0	141.2
Effective Green, g (s)	42.7	42.7		7.0	7.0	7.0	3.1	67.4		6.2	71.0	141.2
Actuated g/C Ratio	0.30	0.30		0.05	0.05	0.05	0.02	0.48		0.04	0.50	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)	1038	521		85	87	80	39	1686		79	1797	1583
v/s Ratio Prot	c0.30	0.01		0.01	0.01		0.01	c0.48		0.03	0.43	
v/s Ratio Perm						0.00						c0.49
v/c Ratio	0.99	0.04		0.21	0.21	0.03	0.36	1.01		0.71	0.85	0.49
Uniform Delay, d1	48.9	34.8		64.5	64.4	63.9	68.1	36.9		66.6	30.6	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	24.3	0.1		2.1	2.0	0.3	5.6	24.8		25.1	4.6	1.1
Delay (s)	73.3	34.9		66.6	66.5	64.2	73.6	61.7		91.7	35.2	1.1
Level of Service	E	C		E	E	E	E	E		F	D	A
Approach Delay (s)		72.0			65.1			61.8			25.4	
Approach LOS		E			E			E			C	

Intersection Summary			
HCM 2000 Control Delay	47.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	141.2	Sum of lost time (s)	17.9
Intersection Capacity Utilization	91.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	171	10	22	40	10	30	39	527	18	11	370	78
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.99	0.99		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1887	1900	1900	1800	1863	1881	1846	1900	1827	1851	1900
Adj Flow Rate, veh/h	184	11	24	43	11	32	42	567	19	12	398	84
Adj No. of Lanes	1	1	0	0	1	1	1	2	0	1	2	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	0	0	0	0	2	1	3	3	4	3	3
Cap, veh/h	627	133	289	539	105	396	589	1365	46	540	1139	238
Arrive On Green	0.25	0.25	0.25	0.25	0.25	0.25	0.39	0.39	0.39	0.39	0.39	0.39
Sat Flow, veh/h	1346	525	1144	1005	416	1568	914	3463	116	807	2891	604
Grp Volume(v), veh/h	184	0	35	54	0	32	42	287	299	12	241	241
Grp Sat Flow(s),veh/h/ln	1346	0	1669	1421	0	1568	914	1754	1825	807	1758	1737
Q Serve(g_s), s	2.8	0.0	0.4	0.0	0.0	0.4	0.8	2.7	2.7	0.2	2.2	2.2
Cycle Q Clear(g_c), s	3.3	0.0	0.4	0.5	0.0	0.4	3.0	2.7	2.7	2.9	2.2	2.2
Prop In Lane	1.00		0.69	0.80		1.00	1.00		0.06	1.00		0.35
Lane Grp Cap(c), veh/h	627	0	422	645	0	396	589	691	719	540	693	685
V/C Ratio(X)	0.29	0.00	0.08	0.08	0.00	0.08	0.07	0.42	0.42	0.02	0.35	0.35
Avail Cap(c_a), veh/h	1475	0	1473	1517	0	1384	914	1316	1369	828	1319	1303
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	7.8	0.0	6.5	6.5	0.0	6.5	5.9	5.0	5.0	6.0	4.8	4.8
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.0	0.2	0.3	0.0	0.2	0.2	1.3	1.4	0.1	1.0	1.0
LnGrp Delay(d),s/veh	7.9	0.0	6.5	6.5	0.0	6.5	5.9	5.1	5.1	6.0	4.9	4.9
LnGrp LOS	A		A	A		A	A	A	A	A	A	A
Approach Vol, veh/h		219			86			628			494	
Approach Delay, s/veh		7.7			6.5			5.2			5.0	
Approach LOS		A			A			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		9.7		12.9		9.7		12.9
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		20.0		17.0		20.0		17.0
Max Q Clear Time (g_c+I1), s		5.3		4.9		2.5		5.0
Green Ext Time (p_c), s		0.6		3.6		0.6		3.6

Intersection Summary		
HCM 2010 Ctrl Delay	5.6	
HCM 2010 LOS	A	

HCM Signalized Intersection Capacity Analysis
1: SR 1 & Carmel Valley Rd

Back AM.syn
1/27/2016

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	0	802	457	59	1116	693
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9	4.9	4.9	4.0
Lane Util. Factor		0.88	1.00	1.00	0.97	1.00
Frt		0.85	1.00	0.85	1.00	1.00
Flt Protected		1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		2760	1863	1509	3335	1759
Flt Permitted		1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		2760	1863	1509	3335	1759
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	872	497	64	1213	753
RTOR Reduction (vph)	0	259	0	9	0	0
Lane Group Flow (vph)	0	613	497	55	1213	753
Heavy Vehicles (%)	0%	3%	2%	7%	5%	8%
Turn Type		Over	NA	Perm	Prot	NA
Protected Phases		3	2		3	Free
Permitted Phases				2		
Actuated Green, G (s)		25.4	20.6	20.6	25.4	55.8
Effective Green, g (s)		25.4	20.6	20.6	25.4	55.8
Actuated g/C Ratio		0.46	0.37	0.37	0.46	1.00
Clearance Time (s)		4.9	4.9	4.9	4.9	
Vehicle Extension (s)		4.5	3.5	3.5	4.5	
Lane Grp Cap (vph)		1256	687	557	1518	1759
v/s Ratio Prot		0.22	c0.27		c0.36	0.43
v/s Ratio Perm				0.04		
v/c Ratio		0.49	0.72	0.10	0.80	0.43
Uniform Delay, d1		10.6	15.1	11.5	13.0	0.0
Progression Factor		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.5	3.9	0.1	3.4	0.8
Delay (s)		11.2	19.1	11.6	16.4	0.8
Level of Service		B	B	B	B	A
Approach Delay (s)	11.2		18.2			10.4
Approach LOS	B		B			B

Intersection Summary			
HCM 2000 Control Delay	11.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	55.8	Sum of lost time (s)	9.8
Intersection Capacity Utilization	64.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: Carmel Rancho Blvd/Carmel Knolls Dr & Carmel Valley Rd

Back AM.syn
1/27/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	27	747	401	420	683	5	86	5	268	10	17	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		0.95	0.95	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00	1.00		1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.98	1.00
Satd. Flow (prot)	1736	3374	1563	3467	3501		1618	1641	1524		1681	1559
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.98	1.00
Satd. Flow (perm)	1736	3374	1563	3467	3501		1618	1641	1524		1681	1559
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	31	849	456	477	776	6	98	6	305	11	19	38
RTOR Reduction (vph)	0	0	278	0	0	0	0	0	257	0	0	37
Lane Group Flow (vph)	31	849	178	477	782	0	52	52	48	0	30	1
Confl. Peds. (#/hr)	2		1			1	1			1		2
Heavy Vehicles (%)	4%	7%	2%	1%	3%	0%	6%	0%	6%	30%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Over	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	7	7	
Permitted Phases			2									7
Actuated Green, G (s)	1.8	22.6	22.6	9.2	30.1		4.3	4.3	9.2		1.5	1.5
Effective Green, g (s)	1.8	22.6	22.6	9.2	30.1		4.3	4.3	9.2		1.5	1.5
Actuated g/C Ratio	0.03	0.39	0.39	0.16	0.52		0.07	0.07	0.16		0.03	0.03
Clearance Time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Vehicle Extension (s)	1.0	1.3	1.3	1.0	1.3		1.0	1.0	1.0		1.0	1.0
Lane Grp Cap (vph)	53	1314	609	549	1816		119	121	241		43	40
v/s Ratio Prot	0.02	c0.25		c0.14	0.22		c0.03	0.03	0.03		c0.02	
v/s Ratio Perm			0.11									0.00
v/c Ratio	0.58	0.65	0.29	0.87	0.43		0.44	0.43	0.20		0.70	0.02
Uniform Delay, d1	27.7	14.4	12.2	23.8	8.6		25.7	25.7	21.2		28.0	27.5
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	10.2	0.8	0.1	13.3	0.1		0.9	0.9	0.2		32.8	0.1
Delay (s)	37.9	15.3	12.3	37.1	8.7		26.6	26.6	21.4		60.9	27.6
Level of Service	D	B	B	D	A		C	C	C		E	C
Approach Delay (s)		14.8			19.5			22.7			42.3	
Approach LOS		B			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	18.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	58.0	Sum of lost time (s)	20.4
Intersection Capacity Utilization	54.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	133	221	36	131	177	150	23	233	81	297	355	41
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1842	1900	1863	1810	1827	1759	1827	1863	1827	1820	1900
Adj Flow Rate, veh/h	145	240	39	142	192	163	25	253	88	323	386	45
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	2	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	3	3	2	5	4	8	4	2	4	4	4
Cap, veh/h	215	633	101	214	378	320	76	451	388	503	560	65
Arrive On Green	0.12	0.21	0.21	0.12	0.21	0.21	0.05	0.25	0.25	0.15	0.35	0.35
Sat Flow, veh/h	1774	3021	484	1774	1810	1534	1675	1827	1574	3375	1599	186
Grp Volume(v), veh/h	145	138	141	142	192	163	25	253	88	323	0	431
Grp Sat Flow(s),veh/h/ln	1774	1750	1755	1774	1810	1534	1675	1827	1574	1688	0	1785
Q Serve(g_s), s	4.7	4.1	4.2	4.6	5.7	5.7	0.9	7.3	2.7	5.4	0.0	12.4
Cycle Q Clear(g_c), s	4.7	4.1	4.2	4.6	5.7	5.7	0.9	7.3	2.7	5.4	0.0	12.4
Prop In Lane	1.00		0.28	1.00		1.00	1.00		1.00	1.00		0.10
Lane Grp Cap(c), veh/h	215	366	368	214	378	320	76	451	388	503	0	625
V/C Ratio(X)	0.67	0.38	0.38	0.66	0.51	0.51	0.33	0.56	0.23	0.64	0.00	0.69
Avail Cap(c_a), veh/h	274	812	814	274	839	711	223	789	680	578	0	840
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	25.3	20.4	20.5	25.3	21.1	21.1	27.8	19.8	18.1	24.1	0.0	16.7
Incr Delay (d2), s/veh	4.4	0.8	0.8	4.0	1.3	1.5	2.5	1.3	0.4	2.0	0.0	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	2.0	2.1	2.5	3.0	2.5	0.5	3.8	1.2	2.6	0.0	6.4
LnGrp Delay(d),s/veh	29.7	21.2	21.2	29.2	22.3	22.6	30.3	21.1	18.4	26.1	0.0	18.5
LnGrp LOS	C	C	C	C	C	C	C	C	B	C		B
Approach Vol, veh/h		424			497			366			754	
Approach Delay, s/veh		24.1			24.4			21.1			21.7	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.0	16.8	6.4	26.0	11.0	16.8	12.7	19.8
Change Period (Y+Rc), s	3.7	* 4.2	3.7	4.9	3.7	* 4.2	3.7	4.9
Max Green Setting (Gmax), s	9.3	* 28	8.0	28.3	9.3	* 28	10.3	26.0
Max Q Clear Time (g_c+I1), s	6.6	6.2	2.9	14.4	6.7	7.7	7.4	9.3
Green Ext Time (p_c), s	0.1	4.2	0.0	4.2	0.1	4.1	0.3	4.6

Intersection Summary	
HCM 2010 Ctrl Delay	22.8
HCM 2010 LOS	C

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	53	387	83	100	269	0	140	0	77	0	0	0
Number	5	2	12	1	6	16	3	8	18			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1900	1860	1900	1810	1792	0	1810	1696	1900			
Adj Flow Rate, veh/h	58	425	91	110	296	0	154	0	85			
Adj No. of Lanes	1	2	0	1	2	0	2	1	0			
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91			
Percent Heavy Veh, %	0	2	2	5	6	0	5	0	5			
Cap, veh/h	80	1707	363	137	2126	0	340	0	146			
Arrive On Green	0.04	0.59	0.59	0.16	1.00	0.00	0.10	0.00	0.10			
Sat Flow, veh/h	1810	2900	616	1723	3495	0	3343	0	1442			
Grp Volume(v), veh/h	58	258	258	110	296	0	154	0	85			
Grp Sat Flow(s),veh/h/ln	1810	1767	1749	1723	1703	0	1672	0	1442			
Q Serve(g_s), s	1.6	3.5	3.6	3.1	0.0	0.0	2.2	0.0	2.8			
Cycle Q Clear(g_c), s	1.6	3.5	3.6	3.1	0.0	0.0	2.2	0.0	2.8			
Prop In Lane	1.00		0.35	1.00		0.00	1.00		1.00			
Lane Grp Cap(c), veh/h	80	1040	1030	137	2126	0	340	0	146			
V/C Ratio(X)	0.72	0.25	0.25	0.80	0.14	0.00	0.45	0.00	0.58			
Avail Cap(c_a), veh/h	199	1040	1030	224	2126	0	1070	0	461			
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.88	0.88	0.88	1.00	1.00	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	23.6	4.9	5.0	20.6	0.0	0.0	21.2	0.0	21.4			
Incr Delay (d2), s/veh	4.0	0.5	0.5	4.0	0.1	0.0	0.4	0.0	1.4			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.9	1.8	1.8	1.6	0.0	0.0	1.0	0.0	1.2			
LnGrp Delay(d),s/veh	27.6	5.4	5.5	24.7	0.1	0.0	21.5	0.0	22.8			
LnGrp LOS	C	A	A	C	A		C		C			
Approach Vol, veh/h		574			406			239				
Approach Delay, s/veh		7.7			6.8			22.0				
Approach LOS		A			A			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	7.5	33.4			5.7	35.2		9.1
Change Period (Y+Rc), s	3.5	4.0			3.5	4.0		4.0
Max Green Setting (Gmax), s	6.5	16.0			5.5	17.0		16.0
Max Q Clear Time (g_c+I1), s	5.1	5.6			3.6	2.0		4.8
Green Ext Time (p_c), s	0.0	2.8			0.0	3.3		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	10.2
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	372	92	61	337	1	32	0	38	0	0	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	0.99		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1820	1900	1845	1845	1900	1900	1638	1712	1900	1900	1900
Adj Flow Rate, veh/h	0	448	111	73	406	1	39	0	46	0	0	0
Adj No. of Lanes	0	2	0	1	2	0	0	1	1	0	1	0
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	0	4	4	3	3	3	0	0	11	0	0	0
Cap, veh/h	0	1824	449	91	2814	7	212	0	80	0	105	0
Arrive On Green	0.00	0.22	0.22	0.05	0.78	0.78	0.06	0.00	0.06	0.00	0.00	0.00
Sat Flow, veh/h	0	2843	677	1757	3587	9	1228	0	1444	0	1900	0
Grp Volume(v), veh/h	0	280	279	73	198	209	39	0	46	0	0	0
Grp Sat Flow(s),veh/h/ln	0	1729	1699	1757	1753	1843	1228	0	1444	0	1900	0
Q Serve(g_s), s	0.0	6.7	6.8	2.1	1.4	1.4	1.5	0.0	1.6	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	6.7	6.8	2.1	1.4	1.4	1.5	0.0	1.6	0.0	0.0	0.0
Prop In Lane	0.00		0.40	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	0	1146	1126	91	1375	1446	212	0	80	0	105	0
V/C Ratio(X)	0.00	0.24	0.25	0.80	0.14	0.14	0.18	0.00	0.57	0.00	0.00	0.00
Avail Cap(c_a), veh/h	0	1146	1126	193	1375	1446	537	0	462	0	608	0
HCM Platoon Ratio	1.00	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.98	0.98	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	9.2	9.2	23.5	1.3	1.3	23.0	0.0	23.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.5	0.5	6.1	0.2	0.2	0.2	0.0	2.4	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.4	3.3	1.1	0.7	0.8	0.5	0.0	0.7	0.0	0.0	0.0
LnGrp Delay(d),s/veh	0.0	9.7	9.7	29.5	1.5	1.5	23.2	0.0	25.4	0.0	0.0	0.0
LnGrp LOS		A	A	C	A	A	C		C			
Approach Vol, veh/h		559			480			85			0	
Approach Delay, s/veh		9.7			5.8			24.4			0.0	
Approach LOS		A			A			C				
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	6.1	37.1		6.8		43.2		6.8				
Change Period (Y+Rc), s	3.5	4.0		4.0		4.0		4.0				
Max Green Setting (Gmax), s	5.5	17.0		16.0		26.0		16.0				
Max Q Clear Time (g_c+I1), s	4.1	8.8		0.0		3.4		3.6				
Green Ext Time (p_c), s	0.0	4.0		0.0		7.2		0.1				

Intersection Summary	
HCM 2010 Ctrl Delay	9.1
HCM 2010 LOS	A

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	226	0	15	0	1	0	16	14	0	0	31	328
Conflicting Peds, #/hr	2	0	2	0	0	0	2	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	210	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	1	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	92	80	92	92	92	80	80	92	92	80	80
Heavy Vehicles, %	7	0	0	2	2	2	0	7	0	0	0	2
Mvmt Flow	282	0	19	0	1	0	20	18	0	0	39	410

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	3	0	0	2	0	0	24	570	2	14	570	5
Stage 1	-	-	-	-	-	-	2	567	-	3	3	-
Stage 2	-	-	-	-	-	-	22	3	-	11	567	-
Critical Hdwy	4.17	-	-	-	-	-	7.1	6.57	-	7.1	6.5	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.57	-	-	-	-
Follow-up Hdwy	2.263	-	-	-	-	-	3.5	4.063	-	3.5	4	3.318
Pot Cap-1 Maneuver	1587	-	-	-	-	-	993	425	-	1007	434	1078
Stage 1	-	-	-	-	-	-	-	-	-	1025	897	-
Stage 2	-	-	-	-	-	-	1002	883	-	-	-	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1584	-	-	-	-	-	552	348	-	-	355	1074
Mov Cap-2 Maneuver	-	-	-	-	-	-	350	1134	-	-	~ -626	-
Stage 1	-	-	-	-	-	-	-	-	-	840	896	-
Stage 2	-	-	-	-	-	-	592	882	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	7.3	0		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	350	-	1584	-	-	-	-	-	-	1074
HCM Lane V/C Ratio	0.057	-	0.178	-	-	-	-	-	-	0.382
HCM Control Delay (s)	15.9	-	7.8	-	-	0	-	-	-	10.4
HCM Lane LOS	C	-	A	-	-	A	-	-	-	B
HCM 95th %tile Q(veh)	0.2	-	0.6	-	-	-	-	-	-	1.8

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	213	40	119	134	38	50	146	1052	37	16	1477	137
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.94	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1869	1900	1900	1842	1900	1827	1840	1900	1357	1827	1845
Adj Flow Rate, veh/h	214	89	137	128	81	57	168	1209	43	18	1698	0
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	3	0	0	0	9	9	4	3	3	40	4	3
Cap, veh/h	290	107	165	151	82	57	163	1829	65	37	1618	731
Arrive On Green	0.16	0.16	0.16	0.08	0.08	0.08	0.09	0.53	0.53	0.03	0.47	0.00
Sat Flow, veh/h	1757	651	1003	1810	977	688	1740	3441	122	1293	3471	1568
Grp Volume(v), veh/h	214	0	226	128	0	138	168	614	638	18	1698	0
Grp Sat Flow(s),veh/h/ln	1757	0	1654	1810	0	1665	1740	1748	1816	1293	1736	1568
Q Serve(g_s), s	10.3	0.0	11.7	6.2	0.0	7.3	8.3	22.5	22.5	1.2	41.3	0.0
Cycle Q Clear(g_c), s	10.3	0.0	11.7	6.2	0.0	7.3	8.3	22.5	22.5	1.2	41.3	0.0
Prop In Lane	1.00		0.61	1.00		0.41	1.00		0.07	1.00		1.00
Lane Grp Cap(c), veh/h	290	0	273	151	0	139	163	929	965	37	1618	731
V/C Ratio(X)	0.74	0.00	0.83	0.85	0.00	0.99	1.03	0.66	0.66	0.49	1.05	0.00
Avail Cap(c_a), veh/h	317	0	299	151	0	139	163	929	965	106	1618	731
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	35.2	0.0	35.8	40.1	0.0	40.6	40.2	15.0	15.0	42.4	23.7	0.0
Incr Delay (d2), s/veh	8.5	0.0	16.8	34.6	0.0	74.0	78.9	2.1	2.1	9.9	36.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.7	0.0	6.6	4.5	0.0	6.2	7.5	11.3	11.7	0.5	27.8	0.0
LnGrp Delay(d),s/veh	43.7	0.0	52.5	74.7	0.0	114.6	119.3	17.1	17.1	52.3	60.3	0.0
LnGrp LOS	D		D	E		F	F	B	B	D	F	
Approach Vol, veh/h		440			266			1420			1716	
Approach Delay, s/veh		48.2			95.4			29.2			60.2	
Approach LOS		D			F			C			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		18.8	12.0	46.2		11.6	6.2	52.0
Change Period (Y+Rc), s		* 4.2	3.7	4.9		4.2	3.7	4.9
Max Green Setting (Gmax), s		* 16	8.3	41.3		7.4	7.3	42.3
Max Q Clear Time (g_c+I1), s		13.7	10.3	43.3		9.3	3.2	24.5
Green Ext Time (p_c), s		0.6	0.0	0.0		0.0	0.0	17.2

Intersection Summary	
HCM 2010 Ctrl Delay	49.8
HCM 2010 LOS	D

Notes

User approved volume balancing among the lanes for turning movement.
* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	402	5	17	18	14	49	19	1290	10	32	1618	702
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.88		1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.99	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1681		1665	1782	1572	1736	3531		1770	3438	1538
Flt Permitted	0.95	1.00		0.95	0.99	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1681		1665	1782	1572	1736	3531		1770	3438	1538
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	467	6	20	21	16	57	22	1500	12	37	1881	816
RTOR Reduction (vph)	0	17	0	0	0	54	0	0	0	0	0	0
Lane Group Flow (vph)	467	9	0	18	19	3	22	1512	0	37	1881	816
Confl. Peds. (#/hr)				1		1			1	1		
Heavy Vehicles (%)	2%	0%	0%	3%	0%	1%	4%	2%	13%	2%	5%	5%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA		Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6						Free
Actuated Green, G (s)	18.9	18.9		6.8	6.8	6.8	4.5	69.7		4.5	70.2	117.8
Effective Green, g (s)	18.9	18.9		6.8	6.8	6.8	4.5	69.7		4.5	70.2	117.8
Actuated g/C Ratio	0.16	0.16		0.06	0.06	0.06	0.04	0.59		0.04	0.60	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)	550	269		96	102	90	66	2089		67	2048	1538
v/s Ratio Prot	c0.14	0.01		0.01	0.01		0.01	0.43		0.02	c0.55	
v/s Ratio Perm						0.00						c0.53
v/c Ratio	0.85	0.03		0.19	0.19	0.04	0.33	0.72		0.55	0.92	0.53
Uniform Delay, d1	48.1	41.7		52.9	52.9	52.4	55.2	17.2		55.7	21.2	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	12.6	0.1		1.6	1.5	0.3	3.0	1.6		9.5	7.5	1.3
Delay (s)	60.6	41.8		54.5	54.4	52.7	58.2	18.7		65.2	28.7	1.3
Level of Service	E	D		D	D	D	E	B		E	C	A
Approach Delay (s)		59.6			53.4			19.3			21.0	
Approach LOS		E			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	25.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	117.8	Sum of lost time (s)	17.9
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM 2010 Signalized Intersection Summary
9: Carmel Rancho Blvd & Shopping Center Dwy

Back AM.syn
1/27/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	54	1	19	9	1	20	17	208	15	76	519	168
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		1.00	1.00		0.99	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1882	1900	1900	1785	1863	1881	1848	1900	1827	1853	1900
Adj Flow Rate, veh/h	70	1	25	12	1	26	22	270	19	99	674	218
Adj No. of Lanes	1	1	0	0	1	1	1	2	0	1	2	0
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Percent Heavy Veh, %	0	0	0	0	0	2	1	3	3	4	3	3
Cap, veh/h	486	7	179	459	21	182	550	1663	116	829	1306	422
Arrive On Green	0.12	0.12	0.12	0.12	0.12	0.12	0.50	0.50	0.50	0.50	0.50	0.50
Sat Flow, veh/h	1392	62	1545	1086	178	1573	626	3329	233	1062	2615	845
Grp Volume(v), veh/h	70	0	26	13	0	26	22	142	147	99	454	438
Grp Sat Flow(s),veh/h/ln	1392	0	1606	1264	0	1573	626	1756	1806	1062	1761	1699
Q Serve(g_s), s	1.0	0.0	0.3	0.0	0.0	0.3	0.5	0.9	0.9	1.2	3.6	3.6
Cycle Q Clear(g_c), s	1.3	0.0	0.3	0.3	0.0	0.3	4.1	0.9	0.9	2.1	3.6	3.6
Prop In Lane	1.00		0.96	0.92		1.00	1.00		0.13	1.00		0.50
Lane Grp Cap(c), veh/h	486	0	186	479	0	182	550	877	902	829	880	849
V/C Ratio(X)	0.14	0.00	0.14	0.03	0.00	0.14	0.04	0.16	0.16	0.12	0.52	0.52
Avail Cap(c_a), veh/h	1662	0	1544	1616	0	1512	749	1434	1475	1167	1439	1388
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	8.9	0.0	8.3	8.2	0.0	8.3	4.9	2.8	2.8	3.4	3.5	3.5
Incr Delay (d2), s/veh	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.1	0.1	0.0	0.1	0.1	0.4	0.5	0.3	1.7	1.6
LnGrp Delay(d),s/veh	8.9	0.0	8.4	8.2	0.0	8.4	4.9	2.9	2.9	3.4	3.7	3.7
LnGrp LOS	A		A	A		A	A	A	A	A	A	A
Approach Vol, veh/h		96			39			311			991	
Approach Delay, s/veh		8.8			8.3			3.0			3.7	
Approach LOS		A			A			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		6.4		14.4		6.4		14.4
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		20.0		17.0		20.0		17.0
Max Q Clear Time (g_c+I1), s		3.3		5.6		2.3		6.1
Green Ext Time (p_c), s		0.2		4.2		0.2		4.1

Intersection Summary	
HCM 2010 Ctrl Delay	4.0
HCM 2010 LOS	A

HCM Signalized Intersection Capacity Analysis
1: SR 1 & Carmel Valley Rd

Back PM.syn
1/27/2016

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	0	929	776	98	935	616
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9	4.9	4.9	4.0
Lane Util. Factor		0.88	1.00	1.00	0.97	1.00
Frt		0.85	1.00	0.85	1.00	1.00
Flt Protected		1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		2814	1863	1553	3467	1881
Flt Permitted		1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		2814	1863	1553	3467	1881
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	988	826	104	995	655
RTOR Reduction (vph)	0	171	0	6	0	0
Lane Group Flow (vph)	0	817	826	98	995	655
Heavy Vehicles (%)	0%	1%	2%	4%	1%	1%
Turn Type		Over	NA	Perm	Prot	NA
Protected Phases		3	2		3	Free
Permitted Phases				2		
Actuated Green, G (s)		20.3	31.1	31.1	20.3	61.2
Effective Green, g (s)		20.3	31.1	31.1	20.3	61.2
Actuated g/C Ratio		0.33	0.51	0.51	0.33	1.00
Clearance Time (s)		4.9	4.9	4.9	4.9	
Vehicle Extension (s)		4.5	3.5	3.5	4.5	
Lane Grp Cap (vph)		933	946	789	1150	1881
v/s Ratio Prot		c0.29	c0.44		0.29	0.35
v/s Ratio Perm				0.06		
v/c Ratio		0.88	0.87	0.12	0.87	0.35
Uniform Delay, d1		19.3	13.3	7.9	19.2	0.0
Progression Factor		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		9.8	9.2	0.1	7.4	0.5
Delay (s)		29.0	22.5	8.0	26.6	0.5
Level of Service		C	C	A	C	A
Approach Delay (s)	29.0		20.8			16.3
Approach LOS	C		C			B

Intersection Summary			
HCM 2000 Control Delay	21.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	61.2	Sum of lost time (s)	9.8
Intersection Capacity Utilization	81.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: Carmel Rancho Blvd/Carmel Knolls Dr & Carmel Valley Rd

Back PM.syn
1/27/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	810	192	330	635	4	276	17	533	4	23	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		0.95	0.95	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	1.00
Satd. Flow (prot)	1805	3539	1615	3467	3571		1715	1729	1599		1887	1553
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	1.00
Satd. Flow (perm)	1805	3539	1615	3467	3571		1715	1729	1599		1887	1553
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	33	862	204	351	676	4	294	18	567	4	24	19
RTOR Reduction (vph)	0	0	132	0	1	0	0	0	485	0	0	19
Lane Group Flow (vph)	33	862	72	351	679	0	156	156	82	0	28	0
Heavy Vehicles (%)	0%	2%	0%	1%	1%	0%	0%	0%	1%	0%	0%	4%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Over	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	7	7	
Permitted Phases			2									7
Actuated Green, G (s)	1.9	21.8	21.8	9.0	29.0		9.1	9.1	9.0		1.6	1.6
Effective Green, g (s)	1.9	21.8	21.8	9.0	29.0		9.1	9.1	9.0		1.6	1.6
Actuated g/C Ratio	0.03	0.35	0.35	0.15	0.47		0.15	0.15	0.15		0.03	0.03
Clearance Time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Vehicle Extension (s)	1.0	1.3	1.3	1.0	1.3		1.0	1.0	1.0		1.0	1.0
Lane Grp Cap (vph)	55	1246	568	504	1673		252	254	232		48	40
v/s Ratio Prot	0.02	c0.24		c0.10	0.19		c0.09	0.09	0.05		c0.01	
v/s Ratio Perm			0.04									0.00
v/c Ratio	0.60	0.69	0.13	0.70	0.41		0.62	0.61	0.36		0.58	0.01
Uniform Delay, d1	29.6	17.2	13.6	25.2	10.8		24.8	24.8	23.8		29.8	29.4
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	11.2	1.4	0.0	3.4	0.1		3.2	3.1	0.3		11.1	0.0
Delay (s)	40.8	18.5	13.6	28.5	10.9		27.9	27.8	24.2		40.9	29.4
Level of Service	D	B	B	C	B		C	C	C		D	C
Approach Delay (s)		18.3			16.9			25.5			36.3	
Approach LOS		B			B			C			D	

Intersection Summary				
HCM 2000 Control Delay	20.2	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.67			
Actuated Cycle Length (s)	61.9	Sum of lost time (s)	20.4	
Intersection Capacity Utilization	70.9%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM 2010 Signalized Intersection Summary
3: SR 1 & Rio Rd

Back PM.syn
1/27/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	143	347	83	175	400	294	162	437	155	263	309	44
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1878	1900	1881	1881	1863	1881	1845	1863	1881	1884	1900
Adj Flow Rate, veh/h	146	354	85	179	408	300	165	446	158	268	315	45
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	2	1	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	1	1	1	1	2	1	3	2	1	1	1
Cap, veh/h	168	881	209	211	622	519	199	522	446	357	442	63
Arrive On Green	0.09	0.31	0.31	0.12	0.33	0.33	0.11	0.28	0.28	0.10	0.27	0.27
Sat Flow, veh/h	1774	2862	679	1792	1881	1571	1792	1845	1575	3476	1610	230
Grp Volume(v), veh/h	146	219	220	179	408	300	165	446	158	268	0	360
Grp Sat Flow(s),veh/h/ln	1774	1784	1758	1792	1881	1571	1792	1845	1575	1738	0	1840
Q Serve(g_s), s	7.1	8.5	8.7	8.6	16.2	13.8	7.9	20.0	7.0	6.6	0.0	15.4
Cycle Q Clear(g_c), s	7.1	8.5	8.7	8.6	16.2	13.8	7.9	20.0	7.0	6.6	0.0	15.4
Prop In Lane	1.00		0.39	1.00		1.00	1.00		1.00	1.00		0.13
Lane Grp Cap(c), veh/h	168	549	541	211	622	519	199	522	446	357	0	505
V/C Ratio(X)	0.87	0.40	0.41	0.85	0.66	0.58	0.83	0.85	0.35	0.75	0.00	0.71
Avail Cap(c_a), veh/h	168	549	541	211	622	519	211	570	486	370	0	547
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	39.0	23.9	23.9	37.8	25.0	24.2	38.0	29.6	25.0	38.1	0.0	28.6
Incr Delay (d2), s/veh	34.8	0.6	0.6	26.2	5.3	4.6	22.3	11.7	0.6	8.0	0.0	4.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.1	4.2	4.3	5.8	9.3	6.6	5.1	11.9	3.1	3.5	0.0	8.4
LnGrp Delay(d),s/veh	73.8	24.4	24.5	64.0	30.4	28.8	60.3	41.3	25.6	46.2	0.0	32.8
LnGrp LOS	E	C	C	E	C	C	E	D	C	D		C
Approach Vol, veh/h		585			887			769			628	
Approach Delay, s/veh		36.8			36.6			42.2			38.5	
Approach LOS		D			D			D			D	

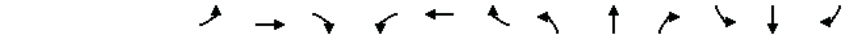
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.0	31.1	13.4	28.9	12.0	33.1	12.7	29.6
Change Period (Y+Rc), s	3.7	* 4.2	3.7	4.9	3.7	* 4.2	3.7	4.9
Max Green Setting (Gmax), s	10.3	* 27	10.3	26.0	8.3	* 29	9.3	27.0
Max Q Clear Time (g_c+I1), s	10.6	10.7	9.9	17.4	9.1	18.2	8.6	22.0
Green Ext Time (p_c), s	0.0	7.2	0.0	3.9	0.0	5.6	0.1	2.6

Intersection Summary	
HCM 2010 Ctrl Delay	38.6
HCM 2010 LOS	D

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	84	459	138	151	447	0	348	0	151	0	0	0
Number	5	2	12	1	6	16	3	8	18			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1900	1867	1900	1881	1881	0	1881	1863	1900			
Adj Flow Rate, veh/h	85	464	139	153	452	0	352	0	153			
Adj No. of Lanes	1	2	0	1	2	0	2	1	0			
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99			
Percent Heavy Veh, %	0	2	2	1	1	0	1	0	1			
Cap, veh/h	108	1370	407	191	1985	0	538	0	245			
Arrive On Green	0.06	0.51	0.51	0.21	1.00	0.00	0.15	0.00	0.15			
Sat Flow, veh/h	1810	2694	801	1792	3668	0	3476	0	1583			
Grp Volume(v), veh/h	85	304	299	153	452	0	352	0	153			
Grp Sat Flow(s),veh/h/ln	1810	1774	1722	1792	1787	0	1738	0	1583			
Q Serve(g_s), s	2.3	5.1	5.2	4.1	0.0	0.0	4.8	0.0	4.5			
Cycle Q Clear(g_c), s	2.3	5.1	5.2	4.1	0.0	0.0	4.8	0.0	4.5			
Prop In Lane	1.00		0.47	1.00		0.00	1.00		1.00			
Lane Grp Cap(c), veh/h	108	902	876	191	1985	0	538	0	245			
V/C Ratio(X)	0.78	0.34	0.34	0.80	0.23	0.00	0.65	0.00	0.62			
Avail Cap(c_a), veh/h	235	902	876	233	1985	0	1112	0	507			
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.87	0.87	0.87	0.99	0.99	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	23.2	7.3	7.3	19.2	0.0	0.0	19.9	0.0	19.8			
Incr Delay (d2), s/veh	4.0	0.9	0.9	12.2	0.3	0.0	0.5	0.0	1.0			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	1.3	2.7	2.6	2.6	0.1	0.0	2.3	0.0	2.0			
LnGrp Delay(d),s/veh	27.2	8.2	8.2	31.3	0.3	0.0	20.4	0.0	20.7			
LnGrp LOS	C	A	A	C	A		C		C			
Approach Vol, veh/h		688			605			505				
Approach Delay, s/veh		10.5			8.1			20.5				
Approach LOS		B			A			C				
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2			5	6		8				
Phs Duration (G+Y+Rc), s	8.8	29.4			6.5	31.8		11.7				
Change Period (Y+Rc), s	3.5	4.0			3.5	4.0		4.0				
Max Green Setting (Gmax), s	6.5	16.0			6.5	16.0		16.0				
Max Q Clear Time (g_c+I1), s	6.1	7.2			4.3	2.0		6.8				
Green Ext Time (p_c), s	0.0	3.4			0.0	4.3		1.0				
Intersection Summary												
HCM 2010 Ctrl Delay			12.5									
HCM 2010 LOS			B									



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	556	54	85	512	0	86	0	110	0	0	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1900	1863	1881	1900	1900	1881	1900	1900	1900	1900
Adj Flow Rate, veh/h	0	573	56	88	528	0	89	0	113	0	0	0
Adj No. of Lanes	0	2	0	1	2	0	0	1	1	0	1	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	0	2	2	2	1	1	0	0	0	0	0	0
Cap, veh/h	0	1955	191	111	2619	0	297	0	173	0	204	0
Arrive On Green	0.00	1.00	1.00	0.06	0.73	0.00	0.11	0.00	0.11	0.00	0.00	0.00
Sat Flow, veh/h	0	3352	318	1774	3668	0	1422	0	1610	0	1900	0
Grp Volume(v), veh/h	0	311	318	88	528	0	89	0	113	0	0	0
Grp Sat Flow(s),veh/h/ln	0	1770	1807	1774	1787	0	1422	0	1610	0	1900	0
Q Serve(g_s), s	0.0	0.0	0.0	2.4	2.3	0.0	3.0	0.0	3.4	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	2.4	2.3	0.0	3.0	0.0	3.4	0.0	0.0	0.0
Prop In Lane	0.00		0.18	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	0	1062	1084	111	2619	0	297	0	173	0	204	0
V/C Ratio(X)	0.00	0.29	0.29	0.79	0.20	0.00	0.30	0.00	0.65	0.00	0.00	0.00
Avail Cap(c_a), veh/h	0	1062	1084	231	2619	0	599	0	515	0	608	0
HCM Platoon Ratio	1.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.94	0.94	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	23.1	2.1	0.0	21.3	0.0	21.4	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.7	0.6	4.6	0.2	0.0	0.2	0.0	1.6	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.2	0.2	1.3	1.2	0.0	1.2	0.0	1.6	0.0	0.0	0.0
LnGrp Delay(d),s/veh	0.0	0.7	0.6	27.7	2.3	0.0	21.5	0.0	23.0	0.0	0.0	0.0
LnGrp LOS		A	A	C	A		C		C			
Approach Vol, veh/h		629			616			202			0	
Approach Delay, s/veh		0.6			5.9			22.3			0.0	
Approach LOS		A			A			C				
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	6.6	34.0		9.4		40.6		9.4				
Change Period (Y+Rc), s	3.5	4.0		4.0		4.0		4.0				
Max Green Setting (Gmax), s	6.5	16.0		16.0		26.0		16.0				
Max Q Clear Time (g_c+I1), s	4.4	2.0		0.0		4.3		5.4				
Green Ext Time (p_c), s	0.0	7.2		0.0		9.3		0.3				
Intersection Summary												
HCM 2010 Ctrl Delay			5.9									
HCM 2010 LOS			A									

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	435	0	62	0	1	0	31	23	0	0	20	441
Conflicting Peds, #/hr	0	0	0	0	0	0	2	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	210	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	92	91	92	92	92	91	91	92	92	91	91
Heavy Vehicles, %	2	0	0	0	0	0	4	0	0	0	0	1
Mvmt Flow	478	0	68	0	1	0	34	25	0	0	22	485

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	2	0	0	14	959	2	16	959	1
Stage 1	-	-	-	-	-	-	2	958	-	1	1	-
Stage 2	-	-	-	-	-	-	12	1	-	15	958	-
Critical Hdwy	4.12	-	-	-	-	-	7.14	6.5	-	7.1	6.5	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.14	5.5	-	-	-	-
Follow-up Hdwy	2.218	-	-	-	-	-	3.536	4	-	3.5	4	3.309
Pot Cap-1 Maneuver	1622	-	-	-	-	-	997	259	-	1004	259	1087
Stage 1	-	-	-	-	-	-	-	-	-	1027	899	-
Stage 2	-	-	-	-	-	-	1003	899	-	-	-	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1622	-	-	-	-	-	540	182	-	-	182	1087
Mov Cap-2 Maneuver	-	-	-	-	-	-	262	~ -547	-	-	~ -58	-
Stage 1	-	-	-	-	-	-	-	-	-	724	899	-
Stage 2	-	-	-	-	-	-	542	899	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	7.1	0		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	262	-	1622	-	-	-	-	-	-	1087
HCM Lane V/C Ratio	0.13	-	0.295	-	-	-	-	-	-	0.446
HCM Control Delay (s)	20.8	-	8.1	-	-	0	-	-	-	10.9
HCM Lane LOS	C	-	A	-	-	A	-	-	-	B
HCM 95th %tile Q(veh)	0.4	-	1.2	-	-	-	-	-	-	2.3

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	277	22	211	34	13	18	267	1439	10	13	1355	153
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.96	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1870	1900	1863	1763	1900	1900	1845	1900	1900	1881	1881
Adj Flow Rate, veh/h	268	56	222	34	16	19	281	1515	11	14	1426	0
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	7	7	2	5	5	0	3	3	0	1	1
Cap, veh/h	332	61	241	114	46	55	292	1904	14	42	1414	633
Arrive On Green	0.19	0.19	0.19	0.06	0.06	0.06	0.16	0.53	0.53	0.02	0.40	0.00
Sat Flow, veh/h	1774	325	1290	1774	717	852	1810	3567	26	1810	3574	1599
Grp Volume(v), veh/h	268	0	278	34	0	35	281	744	782	14	1426	0
Grp Sat Flow(s),veh/h/ln	1774	0	1615	1774	0	1569	1810	1753	1840	1810	1787	1599
Q Serve(g_s), s	12.8	0.0	15.0	1.6	0.0	1.9	13.7	30.5	30.6	0.7	35.1	0.0
Cycle Q Clear(g_c), s	12.8	0.0	15.0	1.6	0.0	1.9	13.7	30.5	30.6	0.7	35.1	0.0
Prop In Lane	1.00		0.80	1.00		0.54	1.00		0.01	1.00		1.00
Lane Grp Cap(c), veh/h	332	0	302	114	0	101	292	936	982	42	1414	633
V/C Ratio(X)	0.81	0.00	0.92	0.30	0.00	0.35	0.96	0.80	0.80	0.34	1.01	0.00
Avail Cap(c_a), veh/h	332	0	302	140	0	124	292	936	982	149	1414	633
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	34.5	0.0	35.4	39.6	0.0	39.7	37.0	16.8	16.8	42.7	26.8	0.0
Incr Delay (d2), s/veh	14.0	0.0	32.0	2.0	0.0	2.9	42.7	5.3	5.0	4.7	26.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.5	0.0	9.4	0.9	0.0	0.9	10.2	16.0	16.8	0.4	22.2	0.0
LnGrp Delay(d),s/veh	48.5	0.0	67.4	41.6	0.0	42.6	79.6	22.0	21.8	47.3	52.8	0.0
LnGrp LOS	D		E	D		D	E	C	C	D	F	
Approach Vol, veh/h		546			69			1807			1440	
Approach Delay, s/veh		58.1			42.1			30.9			52.8	
Approach LOS		E			D			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.8	18.0	40.0		9.9	5.7	52.3
Change Period (Y+Rc), s		* 4.2	3.7	4.9		4.2	3.7	4.9
Max Green Setting (Gmax), s		* 17	14.3	35.1		7.0	7.3	42.1
Max Q Clear Time (g_c+I1), s		17.0	15.7	37.1		3.9	2.7	32.6
Green Ext Time (p_c), s		0.0	0.0	0.0		0.1	0.0	9.4

Intersection Summary	
HCM 2010 Ctrl Delay	43.1
HCM 2010 LOS	D

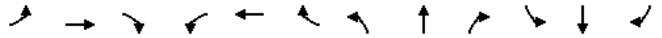
Notes

User approved volume balancing among the lanes for turning movement.
* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	982	17	17	23	12	52	13	1687	14	54	1546	745
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1723		1715	1775	1615	1805	3534		1805	3574	1583
Flt Permitted	0.95	1.00		0.95	0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1723		1715	1775	1615	1805	3534		1805	3574	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1023	18	18	24	12	54	14	1757	15	56	1610	776
RTOR Reduction (vph)	0	13	0	0	0	51	0	1	0	0	0	0
Lane Group Flow (vph)	1023	23	0	18	18	3	14	1771	0	56	1610	776
Heavy Vehicles (%)	2%	0%	4%	0%	0%	0%	0%	2%	3%	0%	1%	2%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA		Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6						Free
Actuated Green, G (s)	42.7	42.7		7.0	7.0	7.0	3.1	67.3		6.3	71.0	141.2
Effective Green, g (s)	42.7	42.7		7.0	7.0	7.0	3.1	67.3		6.3	71.0	141.2
Actuated g/C Ratio	0.30	0.30		0.05	0.05	0.05	0.02	0.48		0.04	0.50	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)	1038	521		85	87	80	39	1684		80	1797	1583
v/s Ratio Prot	c0.30	0.01		0.01	0.01		0.01	c0.50		0.03	0.45	
v/s Ratio Perm						0.00						c0.49
v/c Ratio	0.99	0.04		0.21	0.21	0.03	0.36	1.05		0.70	0.90	0.49
Uniform Delay, d1	48.9	34.8		64.5	64.4	63.9	68.1	36.9		66.5	31.8	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	24.3	0.1		2.1	2.0	0.3	5.6	37.0		23.4	6.7	1.1
Delay (s)	73.3	34.9		66.6	66.5	64.2	73.6	74.0		90.0	38.5	1.1
Level of Service	E	C		E	E	E	E	E		F	D	A
Approach Delay (s)		72.0			65.1			74.0			27.8	
Approach LOS		E			E			E			C	

Intersection Summary			
HCM 2000 Control Delay	52.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	141.2	Sum of lost time (s)	17.9
Intersection Capacity Utilization	93.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	177	10	20	40	10	30	38	542	18	11	388	85
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.99	0.99		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1887	1900	1900	1800	1863	1881	1846	1900	1827	1851	1900
Adj Flow Rate, veh/h	190	11	22	43	11	32	41	583	19	12	417	91
Adj No. of Lanes	1	1	0	0	1	1	1	2	0	1	2	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	0	0	0	0	2	1	3	3	4	3	3
Cap, veh/h	624	143	286	538	106	402	574	1382	45	531	1145	248
Arrive On Green	0.26	0.26	0.26	0.26	0.26	0.26	0.40	0.40	0.40	0.40	0.40	0.40
Sat Flow, veh/h	1347	558	1117	1010	412	1568	893	3466	113	796	2872	621
Grp Volume(v), veh/h	190	0	33	54	0	32	41	295	307	12	254	254
Grp Sat Flow(s),veh/h/ln	1347	0	1675	1422	0	1568	893	1754	1825	796	1759	1734
Q Serve(g_s), s	2.9	0.0	0.3	0.0	0.0	0.4	0.8	2.8	2.8	0.3	2.4	2.4
Cycle Q Clear(g_c), s	3.5	0.0	0.3	0.5	0.0	0.4	3.2	2.8	2.8	3.1	2.4	2.4
Prop In Lane	1.00		0.67	0.80		1.00	1.00		0.06	1.00		0.36
Lane Grp Cap(c), veh/h	624	0	429	643	0	402	574	699	728	531	701	691
V/C Ratio(X)	0.30	0.00	0.08	0.08	0.00	0.08	0.07	0.42	0.42	0.02	0.36	0.37
Avail Cap(c_a), veh/h	1441	0	1445	1484	0	1353	873	1286	1339	797	1290	1272
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	7.9	0.0	6.5	6.6	0.0	6.5	6.0	5.0	5.0	6.2	4.9	4.9
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	0.0	0.2	0.3	0.0	0.2	0.2	1.3	1.4	0.1	1.2	1.2
LnGrp Delay(d),s/veh	8.0	0.0	6.6	6.6	0.0	6.6	6.0	5.2	5.2	6.2	5.0	5.0
LnGrp LOS	A		A	A		A	A	A	A	A	A	A
Approach Vol, veh/h		223			86			643			520	
Approach Delay, s/veh		7.8			6.6			5.2			5.0	
Approach LOS		A			A			A			A	

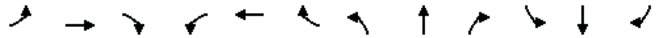
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		9.9		13.2		9.9		13.2
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		20.0		17.0		20.0		17.0
Max Q Clear Time (g_c+I1), s		5.5		5.1		2.5		5.2
Green Ext Time (p_c), s		0.6		3.7		0.6		3.7

Intersection Summary		
HCM 2010 Ctrl Delay	5.6	
HCM 2010 LOS	A	

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	0	804	462	59	1118	694
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9	4.9	4.9	4.0
Lane Util. Factor		0.88	1.00	1.00	0.97	1.00
Frt		0.85	1.00	0.85	1.00	1.00
Flt Protected		1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		2760	1863	1509	3335	1759
Flt Permitted		1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		2760	1863	1509	3335	1759
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	874	502	64	1215	754
RTOR Reduction (vph)	0	255	0	9	0	0
Lane Group Flow (vph)	0	619	502	55	1215	754
Heavy Vehicles (%)	0%	3%	2%	7%	5%	8%
Turn Type		Over	NA	Perm	Prot	NA
Protected Phases		3	2		3	Free
Permitted Phases				2		
Actuated Green, G (s)		25.4	20.7	20.7	25.4	55.9
Effective Green, g (s)		25.4	20.7	20.7	25.4	55.9
Actuated g/C Ratio		0.45	0.37	0.37	0.45	1.00
Clearance Time (s)		4.9	4.9	4.9	4.9	
Vehicle Extension (s)		4.5	3.5	3.5	4.5	
Lane Grp Cap (vph)		1254	689	558	1515	1759
v/s Ratio Prot		0.22	c0.27		c0.36	0.43
v/s Ratio Perm				0.04		
v/c Ratio		0.49	0.73	0.10	0.80	0.43
Uniform Delay, d1		10.7	15.2	11.5	13.1	0.0
Progression Factor		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.5	4.0	0.1	3.5	0.8
Delay (s)		11.3	19.2	11.6	16.6	0.8
Level of Service		B	B	B	B	A
Approach Delay (s)	11.3		18.3			10.5
Approach LOS	B		B			B

Intersection Summary			
HCM 2000 Control Delay	12.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	55.9	Sum of lost time (s)	9.8
Intersection Capacity Utilization	64.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	27	747	403	421	683	5	88	5	270	10	17	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		0.95	0.95	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00	1.00		1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.98	1.00
Satd. Flow (prot)	1736	3374	1563	3467	3501		1618	1641	1524		1681	1559
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.98	1.00
Satd. Flow (perm)	1736	3374	1563	3467	3501		1618	1641	1524		1681	1559
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	31	849	458	478	776	6	100	6	307	11	19	38
RTOR Reduction (vph)	0	0	280	0	0	0	0	0	258	0	0	37
Lane Group Flow (vph)	31	849	178	478	782	0	53	53	49	0	30	1
Confl. Peds. (#/hr)	2		1			1	1			1		2
Heavy Vehicles (%)	4%	7%	2%	1%	3%	0%	6%	0%	6%	30%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Over	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	7	7	
Permitted Phases			2									7
Actuated Green, G (s)	1.8	22.6	22.6	9.2	30.1		4.3	4.3	9.2		1.5	1.5
Effective Green, g (s)	1.8	22.6	22.6	9.2	30.1		4.3	4.3	9.2		1.5	1.5
Actuated g/C Ratio	0.03	0.39	0.39	0.16	0.52		0.07	0.07	0.16		0.03	0.03
Clearance Time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Vehicle Extension (s)	1.0	1.3	1.3	1.0	1.3		1.0	1.0	1.0		1.0	1.0
Lane Grp Cap (vph)	53	1314	609	549	1816		119	121	241		43	40
v/s Ratio Prot	0.02	c0.25		c0.14	0.22		c0.03	0.03	0.03		c0.02	
v/s Ratio Perm			0.11									0.00
v/c Ratio	0.58	0.65	0.29	0.87	0.43		0.45	0.44	0.20		0.70	0.02
Uniform Delay, d1	27.7	14.4	12.2	23.8	8.6		25.7	25.7	21.2		28.0	27.5
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	10.2	0.8	0.1	13.7	0.1		1.0	0.9	0.2		32.8	0.1
Delay (s)	37.9	15.3	12.3	37.5	8.7		26.7	26.6	21.4		60.9	27.6
Level of Service	D	B	B	D	A		C	C	C		E	C
Approach Delay (s)		14.8			19.6			22.7			42.3	
Approach LOS		B			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	18.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	58.0	Sum of lost time (s)	20.4
Intersection Capacity Utilization	54.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	133	222	36	133	179	155	23	233	82	298	355	41
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1842	1900	1863	1810	1827	1759	1827	1863	1827	1820	1900
Adj Flow Rate, veh/h	145	241	39	145	195	168	25	253	89	324	386	45
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	2	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	3	3	2	5	4	8	4	2	4	4	4
Cap, veh/h	214	640	102	214	383	325	76	450	388	500	558	65
Arrive On Green	0.12	0.21	0.21	0.12	0.21	0.21	0.05	0.25	0.25	0.15	0.35	0.35
Sat Flow, veh/h	1774	3023	482	1774	1810	1535	1675	1827	1574	3375	1599	186
Grp Volume(v), veh/h	145	138	142	145	195	168	25	253	89	324	0	431
Grp Sat Flow(s),veh/h/ln	1774	1750	1756	1774	1810	1535	1675	1827	1574	1688	0	1785
Q Serve(g_s), s	4.7	4.1	4.2	4.7	5.8	5.9	0.9	7.3	2.7	5.5	0.0	12.5
Cycle Q Clear(g_c), s	4.7	4.1	4.2	4.7	5.8	5.9	0.9	7.3	2.7	5.5	0.0	12.5
Prop In Lane	1.00		0.27	1.00		1.00	1.00		1.00	1.00		0.10
Lane Grp Cap(c), veh/h	214	371	372	214	383	325	76	450	388	500	0	623
V/C Ratio(X)	0.68	0.37	0.38	0.68	0.51	0.52	0.33	0.56	0.23	0.65	0.00	0.69
Avail Cap(c_a), veh/h	273	808	810	273	835	708	222	786	677	575	0	836
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	25.4	20.4	20.4	25.4	21.1	21.1	28.0	19.9	18.2	24.3	0.0	16.9
Incr Delay (d2), s/veh	4.5	0.8	0.8	4.5	1.3	1.5	2.5	1.3	0.4	2.1	0.0	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	2.0	2.1	2.6	3.0	2.6	0.5	3.8	1.2	2.7	0.0	6.4
LnGrp Delay(d),s/veh	30.0	21.1	21.2	30.0	22.3	22.6	30.4	21.3	18.6	26.3	0.0	18.7
LnGrp LOS	C	C	C	C	C	C	C	C	B	C		B
Approach Vol, veh/h		425			508			367			755	
Approach Delay, s/veh		24.2			24.6			21.2			22.0	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.0	17.0	6.4	26.0	11.0	17.0	12.7	19.8
Change Period (Y+Rc), s	3.7	* 4.2	3.7	4.9	3.7	* 4.2	3.7	4.9
Max Green Setting (Gmax), s	9.3	* 28	8.0	28.3	9.3	* 28	10.3	26.0
Max Q Clear Time (g_c+I1), s	6.7	6.2	2.9	14.5	6.7	7.9	7.5	9.3
Green Ext Time (p_c), s	0.1	4.3	0.0	4.2	0.1	4.2	0.3	4.6

Intersection Summary		
HCM 2010 Ctrl Delay		22.9
HCM 2010 LOS		C

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	53	390	83	101	278	0	140	0	77	0	0	0
Number	5	2	12	1	6	16	3	8	18			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1900	1860	1900	1810	1792	0	1810	1696	1900			
Adj Flow Rate, veh/h	58	429	91	111	305	0	154	0	85			
Adj No. of Lanes	1	2	0	1	2	0	2	1	0			
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91			
Percent Heavy Veh, %	0	2	2	5	6	0	5	0	5			
Cap, veh/h	80	1708	360	138	2126	0	340	0	146			
Arrive On Green	0.04	0.59	0.59	0.16	1.00	0.00	0.10	0.00	0.10			
Sat Flow, veh/h	1810	2905	611	1723	3495	0	3343	0	1442			
Grp Volume(v), veh/h	58	260	260	111	305	0	154	0	85			
Grp Sat Flow(s),veh/h/ln	1810	1767	1750	1723	1703	0	1672	0	1442			
Q Serve(g_s), s	1.6	3.5	3.6	3.1	0.0	0.0	2.2	0.0	2.8			
Cycle Q Clear(g_c), s	1.6	3.5	3.6	3.1	0.0	0.0	2.2	0.0	2.8			
Prop In Lane	1.00		0.35	1.00		0.00	1.00		1.00			
Lane Grp Cap(c), veh/h	80	1039	1029	138	2126	0	340	0	146			
V/C Ratio(X)	0.72	0.25	0.25	0.80	0.14	0.00	0.45	0.00	0.58			
Avail Cap(c_a), veh/h	199	1039	1029	224	2126	0	1070	0	461			
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.88	0.88	0.88	0.99	0.99	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	23.6	5.0	5.0	20.6	0.0	0.0	21.2	0.0	21.4			
Incr Delay (d2), s/veh	4.0	0.5	0.5	4.0	0.1	0.0	0.4	0.0	1.4			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.9	1.8	1.9	1.6	0.0	0.0	1.0	0.0	1.2			
LnGrp Delay(d),s/veh	27.6	5.5	5.5	24.6	0.1	0.0	21.5	0.0	22.8			
LnGrp LOS	C	A	A	C	A		C		C			
Approach Vol, veh/h		578			416			239				
Approach Delay, s/veh		7.7			6.7			22.0				
Approach LOS		A			A			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	7.5	33.4			5.7	35.2		9.1
Change Period (Y+Rc), s	3.5	4.0			3.5	4.0		4.0
Max Green Setting (Gmax), s	6.5	16.0			5.5	17.0		16.0
Max Q Clear Time (g_c+I1), s	5.1	5.6			3.6	2.0		4.8
Green Ext Time (p_c), s	0.0	2.9			0.0	3.4		0.5

Intersection Summary		
HCM 2010 Ctrl Delay		10.1
HCM 2010 LOS		B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	375	92	62	347	1	32	0	38	0	0	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	0.99		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1820	1900	1845	1845	1900	1900	1638	1712	1900	1900	1900
Adj Flow Rate, veh/h	0	452	111	75	418	1	39	0	46	0	0	0
Adj No. of Lanes	0	2	0	1	2	0	0	1	1	0	1	0
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	0	4	4	3	3	3	0	0	11	0	0	0
Cap, veh/h	0	1823	444	94	2814	7	212	0	80	0	105	0
Arrive On Green	0.00	0.22	0.22	0.05	0.78	0.78	0.06	0.00	0.06	0.00	0.00	0.00
Sat Flow, veh/h	0	2848	672	1757	3587	9	1228	0	1444	0	1900	0
Grp Volume(v), veh/h	0	282	281	75	204	215	39	0	46	0	0	0
Grp Sat Flow(s),veh/h/ln	0	1729	1700	1757	1753	1843	1228	0	1444	0	1900	0
Q Serve(g_s), s	0.0	6.7	6.8	2.1	1.4	1.4	1.5	0.0	1.6	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	6.7	6.8	2.1	1.4	1.4	1.5	0.0	1.6	0.0	0.0	0.0
Prop In Lane	0.00		0.40	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	0	1143	1124	94	1375	1446	212	0	80	0	105	0
V/C Ratio(X)	0.00	0.25	0.25	0.80	0.15	0.15	0.18	0.00	0.57	0.00	0.00	0.00
Avail Cap(c_a), veh/h	0	1143	1124	193	1375	1446	537	0	462	0	608	0
HCM Platoon Ratio	1.00	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.98	0.98	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	9.3	9.3	23.4	1.3	1.3	23.0	0.0	23.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.5	0.5	5.8	0.2	0.2	0.2	0.0	2.4	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.4	3.4	1.2	0.8	0.8	0.5	0.0	0.7	0.0	0.0	0.0
LnGrp Delay(d),s/veh	0.0	9.8	9.8	29.2	1.5	1.5	23.2	0.0	25.4	0.0	0.0	0.0
LnGrp LOS		A	A	C	A	A	C		C			
Approach Vol, veh/h		563			494			85			0	
Approach Delay, s/veh		9.8			5.7			24.4			0.0	
Approach LOS		A			A			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	6.2	37.1		6.8		43.2		6.8
Change Period (Y+Rc), s	3.5	4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s	5.5	17.0		16.0		26.0		16.0
Max Q Clear Time (g_c+I1), s	4.1	8.8		0.0		3.4		3.6
Green Ext Time (p_c), s	0.0	4.1		0.0		7.4		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	9.1
HCM 2010 LOS	A

Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	226	0	18	0	1	0	27	19	0	0	34	328
Conflicting Peds, #/hr	2	0	2	0	0	0	2	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	210	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	1	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	92	80	92	92	92	80	80	92	92	80	80
Heavy Vehicles, %	7	0	0	2	2	2	0	7	0	0	0	2
Mvmt Flow	282	0	22	0	1	0	34	24	0	0	42	410

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	3	0	0	2	0	0	26	570	2	17	570	5
Stage 1	-	-	-	-	-	-	2	567	-	3	3	-
Stage 2	-	-	-	-	-	-	24	3	-	14	567	-
Critical Hdwy	4.17	-	-	-	-	-	7.1	6.57	-	7.1	6.5	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.57	-	-	-	-
Follow-up Hdwy	2.263	-	-	-	-	-	3.5	4.063	-	3.5	4	3.318
Pot Cap-1 Maneuver	1587	-	-	-	-	-	990	425	-	1003	434	1078
Stage 1	-	-	-	-	-	-	-	-	-	1025	897	-
Stage 2	-	-	-	-	-	-	999	883	-	-	-	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1584	-	-	-	-	-	553	348	-	-	355	1074
Mov Cap-2 Maneuver	-	-	-	-	-	-	348	1134	-	-	~ -626	-
Stage 1	-	-	-	-	-	-	-	-	-	840	896	-
Stage 2	-	-	-	-	-	-	587	882	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	7.2	0		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	348	-	1584	-	-	-	-	-	-	1074
HCM Lane V/C Ratio	0.097	-	0.178	-	-	-	-	-	-	0.382
HCM Control Delay (s)	16.5	-	7.8	-	-	0	-	-	-	10.4
HCM Lane LOS	C	-	A	-	-	A	-	-	-	B
HCM 95th %tile Q(veh)	0.3	-	0.6	-	-	-	-	-	-	1.8

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	213	40	120	134	38	50	148	1057	37	16	1479	137
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.94	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1869	1900	1900	1842	1900	1827	1840	1900	1357	1827	1845
Adj Flow Rate, veh/h	214	89	138	128	81	57	170	1215	43	18	1700	0
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	3	0	0	0	9	9	4	3	3	40	4	3
Cap, veh/h	290	107	166	151	82	57	163	1828	65	37	1617	730
Arrive On Green	0.17	0.17	0.17	0.08	0.08	0.08	0.09	0.53	0.53	0.03	0.47	0.00
Sat Flow, veh/h	1757	648	1005	1810	977	688	1740	3442	122	1293	3471	1568
Grp Volume(v), veh/h	214	0	227	128	0	138	170	617	641	18	1700	0
Grp Sat Flow(s),veh/h/ln	1757	0	1654	1810	0	1665	1740	1748	1816	1293	1736	1568
Q Serve(g_s), s	10.3	0.0	11.8	6.2	0.0	7.3	8.3	22.7	22.7	1.2	41.3	0.0
Cycle Q Clear(g_c), s	10.3	0.0	11.8	6.2	0.0	7.3	8.3	22.7	22.7	1.2	41.3	0.0
Prop In Lane	1.00		0.61	1.00		0.41	1.00		0.07	1.00		1.00
Lane Grp Cap(c), veh/h	290	0	273	151	0	139	163	928	964	37	1617	730
V/C Ratio(X)	0.74	0.00	0.83	0.85	0.00	0.99	1.04	0.66	0.66	0.49	1.05	0.00
Avail Cap(c_a), veh/h	317	0	298	151	0	139	163	928	964	106	1617	730
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	35.2	0.0	35.8	40.1	0.0	40.6	40.2	15.1	15.1	42.4	23.7	0.0
Incr Delay (d2), s/veh	8.4	0.0	17.0	34.7	0.0	74.2	82.5	2.2	2.1	9.9	37.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.7	0.0	6.7	4.5	0.0	6.2	7.7	11.4	11.8	0.5	27.9	0.0
LnGrp Delay(d),s/veh	43.6	0.0	52.8	74.8	0.0	114.8	122.8	17.2	17.2	52.4	60.9	0.0
LnGrp LOS	D		D	E		F	F	B	B	D	F	
Approach Vol, veh/h		441			266			1428			1718	
Approach Delay, s/veh		48.3			95.5			29.8			60.8	
Approach LOS		D			F			C			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		18.9	12.0	46.2		11.6	6.2	52.0
Change Period (Y+Rc), s		* 4.2	3.7	4.9		4.2	3.7	4.9
Max Green Setting (Gmax), s		* 16	8.3	41.3		7.4	7.3	42.3
Max Q Clear Time (g_c+I1), s		13.8	10.3	43.3		9.3	3.2	24.7
Green Ext Time (p_c), s		0.6	0.0	0.0		0.0	0.0	17.1

Intersection Summary	
HCM 2010 Ctrl Delay	50.3
HCM 2010 LOS	D

Notes

User approved volume balancing among the lanes for turning movement.
* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	402	5	17	18	14	49	19	1295	10	32	1620	702
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.88		1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.99	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1681		1665	1782	1572	1736	3531		1770	3438	1538
Flt Permitted	0.95	1.00		0.95	0.99	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1681		1665	1782	1572	1736	3531		1770	3438	1538
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	467	6	20	21	16	57	22	1506	12	37	1884	816
RTOR Reduction (vph)	0	17	0	0	0	54	0	0	0	0	0	0
Lane Group Flow (vph)	467	9	0	18	19	3	22	1518	0	37	1884	816
Confl. Peds. (#/hr)				1		1			1	1		
Heavy Vehicles (%)	2%	0%	0%	3%	0%	1%	4%	2%	13%	2%	5%	5%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA		Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6						Free
Actuated Green, G (s)	18.9	18.9		6.8	6.8	6.8	4.5	69.7		4.5	70.2	117.8
Effective Green, g (s)	18.9	18.9		6.8	6.8	6.8	4.5	69.7		4.5	70.2	117.8
Actuated g/C Ratio	0.16	0.16		0.06	0.06	0.06	0.04	0.59		0.04	0.60	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)	550	269		96	102	90	66	2089		67	2048	1538
v/s Ratio Prot	c0.14	0.01		0.01	0.01		0.01	0.43		0.02	c0.55	
v/s Ratio Perm						0.00						c0.53
v/c Ratio	0.85	0.03		0.19	0.19	0.04	0.33	0.73		0.55	0.92	0.53
Uniform Delay, d1	48.1	41.7		52.9	52.9	52.4	55.2	17.2		55.7	21.3	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	12.6	0.1		1.6	1.5	0.3	3.0	1.6		9.5	7.6	1.3
Delay (s)	60.6	41.8		54.5	54.4	52.7	58.2	18.8		65.2	28.9	1.3
Level of Service	E	D		D	D	D	E	B		E	C	A
Approach Delay (s)		59.6			53.4			19.4			21.1	
Approach LOS		E			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	25.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	117.8	Sum of lost time (s)	17.9
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM 2010 Signalized Intersection Summary
9: Carmel Rancho Blvd & Shopping Center Dwy

Back + Proj AM.syn
1/27/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	54	1	19	9	1	20	18	212	15	76	522	168
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		1.00	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1882	1900	1900	1785	1863	1881	1848	1900	1827	1853	1900
Adj Flow Rate, veh/h	70	1	25	12	1	26	23	275	19	99	678	218
Adj No. of Lanes	1	1	0	0	1	1	1	2	0	1	2	0
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Percent Heavy Veh, %	0	0	0	0	0	2	1	3	3	4	3	3
Cap, veh/h	484	7	179	457	21	182	549	1671	115	827	1313	422
Arrive On Green	0.12	0.12	0.12	0.12	0.12	0.12	0.50	0.50	0.50	0.50	0.50	0.50
Sat Flow, veh/h	1392	62	1545	1086	182	1573	624	3333	229	1057	2619	842
Grp Volume(v), veh/h	70	0	26	13	0	26	23	144	150	99	456	440
Grp Sat Flow(s),veh/h/ln	1392	0	1606	1267	0	1573	624	1756	1807	1057	1761	1700
Q Serve(g_s), s	1.0	0.0	0.3	0.0	0.0	0.3	0.5	0.9	0.9	1.2	3.6	3.6
Cycle Q Clear(g_c), s	1.3	0.0	0.3	0.3	0.0	0.3	4.2	0.9	0.9	2.1	3.6	3.6
Prop In Lane	1.00		0.96	0.92		1.00	1.00		0.13	1.00		0.50
Lane Grp Cap(c), veh/h	484	0	186	478	0	182	549	880	906	827	883	852
V/C Ratio(X)	0.14	0.00	0.14	0.03	0.00	0.14	0.04	0.16	0.17	0.12	0.52	0.52
Avail Cap(c_a), veh/h	1656	0	1538	1610	0	1506	744	1429	1470	1157	1433	1383
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	8.9	0.0	8.3	8.2	0.0	8.3	4.9	2.8	2.8	3.4	3.5	3.5
Incr Delay (d2), s/veh	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.1	0.1	0.0	0.1	0.1	0.4	0.5	0.3	1.7	1.6
LnGrp Delay(d),s/veh	9.0	0.0	8.4	8.2	0.0	8.4	4.9	2.9	2.9	3.4	3.7	3.7
LnGrp LOS	A		A	A		A	A	A	A	A	A	A
Approach Vol, veh/h		96			39			317			995	
Approach Delay, s/veh		8.8			8.4			3.0			3.7	
Approach LOS		A			A			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		6.4		14.5		6.4		14.5
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		20.0		17.0		20.0		17.0
Max Q Clear Time (g_c+I1), s		3.3		5.6		2.3		6.2
Green Ext Time (p_c), s		0.2		4.2		0.2		4.1

Intersection Summary		
HCM 2010 Ctrl Delay		4.0
HCM 2010 LOS		A

HCM Signalized Intersection Capacity Analysis
1: SR 1 & Carmel Valley Rd

Back + Proj PM.syn
1/27/2016

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	0	930	780	98	937	621
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9	4.9	4.9	4.0
Lane Util. Factor		0.88	1.00	1.00	0.97	1.00
Frt		0.85	1.00	0.85	1.00	1.00
Flt Protected		1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		2814	1863	1553	3467	1881
Flt Permitted		1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		2814	1863	1553	3467	1881
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	989	830	104	997	661
RTOR Reduction (vph)	0	170	0	6	0	0
Lane Group Flow (vph)	0	819	830	98	997	661
Heavy Vehicles (%)	0%	1%	2%	4%	1%	1%
Turn Type		Over	NA	Perm	Prot	NA
Protected Phases		3	2		3	Free
Permitted Phases				2		
Actuated Green, G (s)		20.3	31.1	31.1	20.3	61.2
Effective Green, g (s)		20.3	31.1	31.1	20.3	61.2
Actuated g/C Ratio		0.33	0.51	0.51	0.33	1.00
Clearance Time (s)		4.9	4.9	4.9	4.9	
Vehicle Extension (s)		4.5	3.5	3.5	4.5	
Lane Grp Cap (vph)		933	946	789	1150	1881
v/s Ratio Prot		c0.29	c0.45		0.29	0.35
v/s Ratio Perm				0.06		
v/c Ratio		0.88	0.88	0.12	0.87	0.35
Uniform Delay, d1		19.3	13.4	7.9	19.2	0.0
Progression Factor		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		9.9	9.4	0.1	7.5	0.5
Delay (s)		29.2	22.8	8.0	26.7	0.5
Level of Service		C	C	A	C	A
Approach Delay (s)	29.2		21.1			16.3
Approach LOS	C		C			B

Intersection Summary				
HCM 2000 Control Delay		21.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio		0.88		
Actuated Cycle Length (s)		61.2	Sum of lost time (s)	9.8
Intersection Capacity Utilization		81.8%	ICU Level of Service	D
Analysis Period (min)		15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	810	194	333	635	4	277	17	535	4	23	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		0.95	0.95	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	1.00
Satd. Flow (prot)	1805	3539	1615	3467	3571		1715	1728	1599		1887	1553
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	1.00
Satd. Flow (perm)	1805	3539	1615	3467	3571		1715	1728	1599		1887	1553
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	33	862	206	354	676	4	295	18	569	4	24	19
RTOR Reduction (vph)	0	0	133	0	1	0	0	0	486	0	0	19
Lane Group Flow (vph)	33	862	73	354	679	0	156	157	83	0	28	0
Heavy Vehicles (%)	0%	2%	0%	1%	1%	0%	0%	0%	1%	0%	0%	4%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Over	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	7	7	
Permitted Phases			2									7
Actuated Green, G (s)	1.9	21.8	21.8	9.0	29.0		9.1	9.1	9.0		1.6	1.6
Effective Green, g (s)	1.9	21.8	21.8	9.0	29.0		9.1	9.1	9.0		1.6	1.6
Actuated g/C Ratio	0.03	0.35	0.35	0.15	0.47		0.15	0.15	0.15		0.03	0.03
Clearance Time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Vehicle Extension (s)	1.0	1.3	1.3	1.0	1.3		1.0	1.0	1.0		1.0	1.0
Lane Grp Cap (vph)	55	1246	568	504	1673		252	254	232		48	40
v/s Ratio Prot	0.02	c0.24		c0.10	0.19		c0.09	0.09	0.05		c0.01	
v/s Ratio Perm			0.04									0.00
v/c Ratio	0.60	0.69	0.13	0.70	0.41		0.62	0.62	0.36		0.58	0.01
Uniform Delay, d1	29.6	17.2	13.6	25.2	10.8		24.8	24.8	23.8		29.8	29.4
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	11.2	1.4	0.0	3.6	0.1		3.2	3.1	0.3		11.1	0.0
Delay (s)	40.8	18.5	13.6	28.8	10.9		27.9	27.9	24.2		40.9	29.4
Level of Service	D	B	B	C	B		C	C	C		D	C
Approach Delay (s)		18.3			17.0			25.5			36.3	
Approach LOS		B			B			C			D	

Intersection Summary				
HCM 2000 Control Delay	20.2	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.67			
Actuated Cycle Length (s)	61.9	Sum of lost time (s)	20.4	
Intersection Capacity Utilization	71.0%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	143	350	83	176	402	298	162	437	157	268	309	44
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1878	1900	1881	1881	1863	1881	1845	1863	1881	1884	1900
Adj Flow Rate, veh/h	146	357	85	180	410	304	165	446	160	273	315	45
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	2	1	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	1	1	1	1	2	1	3	2	1	1	1
Cap, veh/h	168	882	208	211	622	519	199	522	446	357	442	63
Arrive On Green	0.09	0.31	0.31	0.12	0.33	0.33	0.11	0.28	0.28	0.10	0.27	0.27
Sat Flow, veh/h	1774	2868	675	1792	1881	1571	1792	1845	1575	3476	1610	230
Grp Volume(v), veh/h	146	220	222	180	410	304	165	446	160	273	0	360
Grp Sat Flow(s),veh/h/ln	1774	1784	1759	1792	1881	1571	1792	1845	1575	1738	0	1840
Q Serve(g_s), s	7.1	8.5	8.7	8.6	16.3	14.0	7.9	20.0	7.1	6.7	0.0	15.4
Cycle Q Clear(g_c), s	7.1	8.5	8.7	8.6	16.3	14.0	7.9	20.0	7.1	6.7	0.0	15.4
Prop In Lane	1.00		0.38	1.00		1.00	1.00		1.00	1.00		0.13
Lane Grp Cap(c), veh/h	168	549	541	211	622	519	199	522	446	357	0	505
V/C Ratio(X)	0.87	0.40	0.41	0.85	0.66	0.59	0.83	0.85	0.36	0.76	0.00	0.71
Avail Cap(c_a), veh/h	168	549	541	211	622	519	211	570	486	370	0	547
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	39.0	23.9	24.0	37.8	25.0	24.3	38.0	29.6	25.0	38.2	0.0	28.6
Incr Delay (d2), s/veh	34.8	0.6	0.6	27.0	5.4	4.8	22.3	11.7	0.6	8.9	0.0	4.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.1	4.3	4.3	5.8	9.4	6.7	5.1	11.9	3.1	3.7	0.0	8.4
LnGrp Delay(d),s/veh	73.8	24.5	24.6	64.8	30.5	29.1	60.3	41.3	25.6	47.1	0.0	32.8
LnGrp LOS	E	C	C	E	C	C	E	D	C	D		C
Approach Vol, veh/h		588			894			771			633	
Approach Delay, s/veh		36.8			36.9			42.1			39.0	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.0	31.1	13.4	28.9	12.0	33.1	12.7	29.6
Change Period (Y+Rc), s	3.7	* 4.2	3.7	4.9	3.7	* 4.2	3.7	4.9
Max Green Setting (Gmax), s	10.3	* 27	10.3	26.0	8.3	* 29	9.3	27.0
Max Q Clear Time (g_c+I1), s	10.6	10.7	9.9	17.4	9.1	18.3	8.7	22.0
Green Ext Time (p_c), s	0.0	7.3	0.0	3.9	0.0	5.6	0.1	2.6

Intersection Summary	
HCM 2010 Ctrl Delay	38.7
HCM 2010 LOS	D

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	84	469	138	151	454	0	348	0	152	0	0	0
Number	5	2	12	1	6	16	3	8	18			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1900	1867	1900	1881	1881	0	1881	1863	1900			
Adj Flow Rate, veh/h	85	474	139	153	459	0	352	0	154			
Adj No. of Lanes	1	2	0	1	2	0	2	1	0			
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99			
Percent Heavy Veh, %	0	2	2	1	1	0	1	0	1			
Cap, veh/h	108	1377	401	191	1984	0	538	0	245			
Arrive On Green	0.06	0.51	0.51	0.21	1.00	0.00	0.15	0.00	0.15			
Sat Flow, veh/h	1810	2709	789	1792	3668	0	3476	0	1583			
Grp Volume(v), veh/h	85	309	304	153	459	0	352	0	154			
Grp Sat Flow(s),veh/h/ln	1810	1774	1724	1792	1787	0	1738	0	1583			
Q Serve(g_s), s	2.3	5.2	5.3	4.1	0.0	0.0	4.8	0.0	4.6			
Cycle Q Clear(g_c), s	2.3	5.2	5.3	4.1	0.0	0.0	4.8	0.0	4.6			
Prop In Lane	1.00		0.46	1.00		0.00	1.00		1.00			
Lane Grp Cap(c), veh/h	108	902	877	191	1984	0	538	0	245			
V/C Ratio(X)	0.78	0.34	0.35	0.80	0.23	0.00	0.65	0.00	0.63			
Avail Cap(c_a), veh/h	235	902	877	233	1984	0	1112	0	507			
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.86	0.86	0.86	0.99	0.99	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	23.2	7.3	7.3	19.2	0.0	0.0	19.9	0.0	19.8			
Incr Delay (d2), s/veh	4.0	0.9	0.9	12.1	0.3	0.0	0.5	0.0	1.0			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	1.3	2.7	2.7	2.6	0.1	0.0	2.3	0.0	2.0			
LnGrp Delay(d),s/veh	27.2	8.2	8.3	31.3	0.3	0.0	20.4	0.0	20.8			
LnGrp LOS	C	A	A	C	A		C		C			
Approach Vol, veh/h		698			612			506				
Approach Delay, s/veh		10.5			8.0			20.5				
Approach LOS		B			A			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	8.8	29.4			6.5	31.8		11.7
Change Period (Y+Rc), s	3.5	4.0			3.5	4.0		4.0
Max Green Setting (Gmax), s	6.5	16.0			6.5	16.0		16.0
Max Q Clear Time (g_c+I1), s	6.1	7.3			4.3	2.0		6.8
Green Ext Time (p_c), s	0.0	3.4			0.0	4.4		1.0

Intersection Summary	
HCM 2010 Ctrl Delay	12.5
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	567	54	85	519	0	86	0	111	0	0	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1900	1863	1881	1900	1900	1881	1900	1900	1900	1900
Adj Flow Rate, veh/h	0	585	56	88	535	0	89	0	114	0	0	0
Adj No. of Lanes	0	2	0	1	2	0	0	1	1	0	1	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	0	2	2	2	1	1	0	0	0	0	0	0
Cap, veh/h	0	1957	187	111	2617	0	297	0	174	0	205	0
Arrive On Green	0.00	1.00	1.00	0.06	0.73	0.00	0.11	0.00	0.11	0.00	0.00	0.00
Sat Flow, veh/h	0	3358	312	1774	3668	0	1422	0	1611	0	1900	0
Grp Volume(v), veh/h	0	317	324	88	535	0	89	0	114	0	0	0
Grp Sat Flow(s),veh/h/ln	0	1770	1808	1774	1787	0	1422	0	1611	0	1900	0
Q Serve(g_s), s	0.0	0.0	0.0	2.4	2.4	0.0	3.0	0.0	3.4	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	2.4	2.4	0.0	3.0	0.0	3.4	0.0	0.0	0.0
Prop In Lane	0.00		0.17	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	0	1060	1083	111	2617	0	297	0	174	0	205	0
V/C Ratio(X)	0.00	0.30	0.30	0.79	0.20	0.00	0.30	0.00	0.66	0.00	0.00	0.00
Avail Cap(c_a), veh/h	0	1060	1083	231	2617	0	599	0	515	0	608	0
HCM Platoon Ratio	1.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.93	0.93	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	23.1	2.1	0.0	21.2	0.0	21.4	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.7	0.7	4.6	0.2	0.0	0.2	0.0	1.6	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.2	0.2	1.3	1.2	0.0	1.2	0.0	1.6	0.0	0.0	0.0
LnGrp Delay(d),s/veh	0.0	0.7	0.7	27.7	2.3	0.0	21.4	0.0	23.0	0.0	0.0	0.0
LnGrp LOS		A	A	C	A		C		C			
Approach Vol, veh/h		641			623			203			0	
Approach Delay, s/veh		0.7			5.9			22.3			0.0	
Approach LOS		A			A			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	6.6	34.0		9.4		40.6		9.4
Change Period (Y+Rc), s	3.5	4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s	6.5	16.0		16.0		26.0		16.0
Max Q Clear Time (g_c+I1), s	4.4	2.0		0.0		4.4		5.4
Green Ext Time (p_c), s	0.0	7.3		0.0		9.4		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	5.9
HCM 2010 LOS	A

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	435	0	74	0	1	0	38	27	0	0	27	441
Conflicting Peds, #/hr	0	0	0	0	0	0	2	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	210	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	92	91	92	92	92	91	91	92	92	91	91
Heavy Vehicles, %	2	0	0	0	0	0	4	0	0	0	0	1
Mvmt Flow	478	0	81	0	1	0	42	30	0	0	30	485

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	2	0	0	18	959	2	18	959	1
Stage 1	-	-	-	-	-	-	2	958	-	1	1	-
Stage 2	-	-	-	-	-	-	16	1	-	17	958	-
Critical Hdwy	4.12	-	-	-	-	-	7.14	6.5	-	7.1	6.5	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.14	5.5	-	-	-	-
Follow-up Hdwy	2.218	-	-	-	-	-	3.536	4	-	3.5	4	3.309
Pot Cap-1 Maneuver	1622	-	-	-	-	-	991	259	-	1001	259	1087
Stage 1	-	-	-	-	-	-	-	-	-	1027	899	-
Stage 2	-	-	-	-	-	-	998	899	-	-	-	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1622	-	-	-	-	-	576	182	-	-	182	1087
Mov Cap-2 Maneuver	-	-	-	-	-	-	276	~ -547	-	-	~ -58	-
Stage 1	-	-	-	-	-	-	-	-	-	724	899	-
Stage 2	-	-	-	-	-	-	535	899	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	7	0		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	276	-	1622	-	-	-	-	-	-	1087
HCM Lane V/C Ratio	0.151	-	0.295	-	-	-	-	-	-	0.446
HCM Control Delay (s)	20.4	-	8.1	-	-	0	-	-	-	10.9
HCM Lane LOS	C	-	A	-	-	A	-	-	-	B
HCM 95th %tile Q(veh)	0.5	-	1.2	-	-	-	-	-	-	2.3

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	277	22	213	34	13	18	268	1443	10	13	1360	153
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.96	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1870	1900	1863	1763	1900	1900	1845	1900	1900	1881	1881
Adj Flow Rate, veh/h	270	54	224	34	16	19	282	1519	11	14	1432	0
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	7	7	2	5	5	0	3	3	0	1	1
Cap, veh/h	332	59	243	114	46	55	292	1904	14	42	1414	633
Arrive On Green	0.19	0.19	0.19	0.06	0.06	0.06	0.16	0.53	0.53	0.02	0.40	0.00
Sat Flow, veh/h	1774	313	1300	1774	717	852	1810	3567	26	1810	3574	1599
Grp Volume(v), veh/h	270	0	278	34	0	35	282	746	784	14	1432	0
Grp Sat Flow(s),veh/h/ln	1774	0	1613	1774	0	1569	1810	1753	1840	1810	1787	1599
Q Serve(g_s), s	12.9	0.0	15.0	1.6	0.0	1.9	13.7	30.7	30.7	0.7	35.1	0.0
Cycle Q Clear(g_c), s	12.9	0.0	15.0	1.6	0.0	1.9	13.7	30.7	30.7	0.7	35.1	0.0
Prop In Lane	1.00		0.81	1.00		0.54	1.00		0.01	1.00		1.00
Lane Grp Cap(c), veh/h	332	0	302	114	0	101	292	936	982	42	1414	633
V/C Ratio(X)	0.81	0.00	0.92	0.30	0.00	0.35	0.97	0.80	0.80	0.34	1.01	0.00
Avail Cap(c_a), veh/h	332	0	302	140	0	124	292	936	982	149	1414	633
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	34.6	0.0	35.4	39.6	0.0	39.7	37.0	16.8	16.8	42.7	26.8	0.0
Incr Delay (d2), s/veh	14.6	0.0	32.2	2.0	0.0	2.9	43.6	5.3	5.1	4.7	27.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.6	0.0	9.4	0.9	0.0	0.9	10.3	16.1	16.9	0.4	22.4	0.0
LnGrp Delay(d),s/veh	49.2	0.0	67.6	41.6	0.0	42.6	80.5	22.1	21.9	47.3	53.9	0.0
LnGrp LOS	D		E	D		D	F	C	C	D	F	
Approach Vol, veh/h		548			69			1812			1446	
Approach Delay, s/veh		58.5			42.1			31.1			53.9	
Approach LOS		E			D			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.8	18.0	40.0		9.9	5.7	52.3
Change Period (Y+Rc), s		* 4.2	3.7	4.9		4.2	3.7	4.9
Max Green Setting (Gmax), s		* 17	14.3	35.1		7.0	7.3	42.1
Max Q Clear Time (g_c+I1), s		17.0	15.7	37.1		3.9	2.7	32.7
Green Ext Time (p_c), s		0.0	0.0	0.0		0.1	0.0	9.2

Intersection Summary	
HCM 2010 Ctrl Delay	43.7
HCM 2010 LOS	D

Notes

User approved volume balancing among the lanes for turning movement.
* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	982	17	17	23	12	52	13	1691	14	54	1551	745
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1723		1715	1775	1615	1805	3534		1805	3574	1583
Flt Permitted	0.95	1.00		0.95	0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1723		1715	1775	1615	1805	3534		1805	3574	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1023	18	18	24	12	54	14	1761	15	56	1616	776
RTOR Reduction (vph)	0	13	0	0	0	51	0	1	0	0	0	0
Lane Group Flow (vph)	1023	23	0	18	18	3	14	1775	0	56	1616	776
Heavy Vehicles (%)	2%	0%	4%	0%	0%	0%	0%	2%	3%	0%	1%	2%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA		Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6						Free
Actuated Green, G (s)	42.7	42.7		7.0	7.0	7.0	3.1	67.3		6.3	71.0	141.2
Effective Green, g (s)	42.7	42.7		7.0	7.0	7.0	3.1	67.3		6.3	71.0	141.2
Actuated g/C Ratio	0.30	0.30		0.05	0.05	0.05	0.02	0.48		0.04	0.50	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)	1038	521		85	87	80	39	1684		80	1797	1583
v/s Ratio Prot	c0.30	0.01		0.01	0.01		0.01	c0.50		0.03	0.45	
v/s Ratio Perm						0.00						c0.49
v/c Ratio	0.99	0.04		0.21	0.21	0.03	0.36	1.05		0.70	0.90	0.49
Uniform Delay, d1	48.9	34.8		64.5	64.4	63.9	68.1	36.9		66.5	31.9	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	24.3	0.1		2.1	2.0	0.3	5.6	37.8		23.4	6.9	1.1
Delay (s)	73.3	34.9		66.6	66.5	64.2	73.6	74.8		90.0	38.7	1.1
Level of Service	E	C		E	E	E	E	E		F	D	A
Approach Delay (s)		72.0			65.1			74.8			28.0	
Approach LOS		E			E			E			C	

Intersection Summary			
HCM 2000 Control Delay	52.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	141.2	Sum of lost time (s)	17.9
Intersection Capacity Utilization	93.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	177	10	22	40	10	30	39	545	18	11	393	85
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.99	0.99		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1887	1900	1900	1800	1863	1881	1846	1900	1827	1851	1900
Adj Flow Rate, veh/h	190	11	24	43	11	32	42	586	19	12	423	91
Adj No. of Lanes	1	1	0	0	1	1	1	2	0	1	2	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	0	0	0	0	2	1	3	3	4	3	3
Cap, veh/h	623	135	294	536	105	402	572	1388	45	530	1153	246
Arrive On Green	0.26	0.26	0.26	0.26	0.26	0.26	0.40	0.40	0.40	0.40	0.40	0.40
Sat Flow, veh/h	1347	525	1145	1009	411	1569	888	3467	112	793	2880	614
Grp Volume(v), veh/h	190	0	35	54	0	32	42	296	309	12	257	257
Grp Sat Flow(s),veh/h/ln	1347	0	1669	1420	0	1569	888	1754	1825	793	1758	1735
Q Serve(g_s), s	2.9	0.0	0.4	0.0	0.0	0.4	0.8	2.8	2.8	0.3	2.4	2.4
Cycle Q Clear(g_c), s	3.5	0.0	0.4	0.5	0.0	0.4	3.2	2.8	2.8	3.1	2.4	2.4
Prop In Lane	1.00		0.69	0.80		1.00	1.00		0.06	1.00		0.35
Lane Grp Cap(c), veh/h	623	0	428	642	0	402	572	702	731	530	704	695
V/C Ratio(X)	0.31	0.00	0.08	0.08	0.00	0.08	0.07	0.42	0.42	0.02	0.36	0.37
Avail Cap(c_a), veh/h	1432	0	1432	1474	0	1345	864	1279	1331	790	1282	1265
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	8.0	0.0	6.6	6.6	0.0	6.6	6.1	5.0	5.0	6.2	4.9	4.9
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	0.0	0.2	0.3	0.0	0.2	0.2	1.3	1.4	0.1	1.2	1.2
LnGrp Delay(d),s/veh	8.1	0.0	6.6	6.7	0.0	6.6	6.1	5.2	5.2	6.2	5.0	5.0
LnGrp LOS	A		A	A		A	A	A	A	A	A	A
Approach Vol, veh/h		225			86			647			526	
Approach Delay, s/veh		7.9			6.6			5.3			5.1	
Approach LOS		A			A			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		10.0		13.3		10.0		13.3
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		20.0		17.0		20.0		17.0
Max Q Clear Time (g_c+I1), s		5.5		5.1		2.5		5.2
Green Ext Time (p_c), s		0.6		3.8		0.6		3.7

Intersection Summary		
HCM 2010 Ctrl Delay	5.7	
HCM 2010 LOS	A	

HCM Signalized Intersection Capacity Analysis
1: SR 1 & Carmel Valley Rd

Cum AM.syn
1/27/2016

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	0	853	538	61	1140	834
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9	4.9	4.9	4.0
Lane Util. Factor		0.88	1.00	1.00	0.97	1.00
Frt		0.85	1.00	0.85	1.00	1.00
Flt Protected		1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		2760	1863	1509	3335	1759
Flt Permitted		1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		2760	1863	1509	3335	1759
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	927	585	66	1239	907
RTOR Reduction (vph)	0	208	0	8	0	0
Lane Group Flow (vph)	0	719	585	58	1239	907
Heavy Vehicles (%)	0%	3%	2%	7%	5%	8%
Turn Type		Over	NA	Perm	Prot	NA
Protected Phases		3	2		3	Free
Permitted Phases				2		
Actuated Green, G (s)		25.4	23.4	23.4	25.4	58.6
Effective Green, g (s)		25.4	23.4	23.4	25.4	58.6
Actuated g/C Ratio		0.43	0.40	0.40	0.43	1.00
Clearance Time (s)		4.9	4.9	4.9	4.9	
Vehicle Extension (s)		4.5	3.5	3.5	4.5	
Lane Grp Cap (vph)		1196	743	602	1445	1759
v/s Ratio Prot		0.26	c0.31		c0.37	0.52
v/s Ratio Perm				0.04		
v/c Ratio		0.60	0.79	0.10	0.86	0.52
Uniform Delay, d1		12.7	15.4	11.0	15.0	0.0
Progression Factor		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		1.1	5.7	0.1	5.6	1.1
Delay (s)		13.8	21.1	11.1	20.6	1.1
Level of Service		B	C	B	C	A
Approach Delay (s)	13.8		20.1			12.4
Approach LOS	B		C			B

Intersection Summary			
HCM 2000 Control Delay	14.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	58.6	Sum of lost time (s)	9.8
Intersection Capacity Utilization	69.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: Carmel Rancho Blvd/Carmel Knolls Dr & Carmel Valley Rd

Cum AM.syn
1/27/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	27	773	401	467	734	5	86	5	293	10	17	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		0.95	0.95	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00	1.00		1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.98	1.00
Satd. Flow (prot)	1736	3374	1563	3467	3501		1618	1641	1524		1681	1558
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.98	1.00
Satd. Flow (perm)	1736	3374	1563	3467	3501		1618	1641	1524		1681	1558
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	31	878	456	531	834	6	98	6	333	11	19	38
RTOR Reduction (vph)	0	0	275	0	0	0	0	0	281	0	0	37
Lane Group Flow (vph)	31	878	181	531	840	0	52	52	52	0	30	1
Confl. Peds. (#/hr)	2		1			1	1			1		2
Heavy Vehicles (%)	4%	7%	2%	1%	3%	0%	6%	0%	6%	30%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Over	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	7	7	
Permitted Phases			2									7
Actuated Green, G (s)	1.8	23.4	23.4	9.2	30.9		4.3	4.3	9.2		1.5	1.5
Effective Green, g (s)	1.8	23.4	23.4	9.2	30.9		4.3	4.3	9.2		1.5	1.5
Actuated g/C Ratio	0.03	0.40	0.40	0.16	0.53		0.07	0.07	0.16		0.03	0.03
Clearance Time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Vehicle Extension (s)	1.0	1.3	1.3	1.0	1.3		1.0	1.0	1.0		1.0	1.0
Lane Grp Cap (vph)	53	1342	622	542	1839		118	120	238		42	39
v/s Ratio Prot	0.02	c0.26		c0.15	0.24		c0.03	0.03	0.03		c0.02	
v/s Ratio Perm			0.12									0.00
v/c Ratio	0.58	0.65	0.29	0.98	0.46		0.44	0.43	0.22		0.71	0.02
Uniform Delay, d1	28.1	14.4	12.1	24.7	8.7		26.1	26.1	21.7		28.4	27.9
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	10.2	0.9	0.1	32.9	0.1		1.0	0.9	0.2		38.0	0.1
Delay (s)	38.3	15.3	12.2	57.6	8.8		27.1	27.0	21.8		66.5	28.0
Level of Service	D	B	B	E	A		C	C	C		E	C
Approach Delay (s)		14.8			27.7			23.1			45.0	
Approach LOS		B			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	22.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	58.8	Sum of lost time (s)	20.4
Intersection Capacity Utilization	56.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	133	229	36	140	183	172	23	294	85	325	468	41
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1842	1900	1863	1810	1827	1759	1827	1863	1827	1821	1900
Adj Flow Rate, veh/h	145	249	39	152	199	187	25	320	92	353	509	45
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	2	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	3	3	2	5	4	8	4	2	4	4	4
Cap, veh/h	202	654	101	204	391	332	75	510	440	465	614	54
Arrive On Green	0.11	0.22	0.22	0.11	0.22	0.22	0.04	0.28	0.28	0.14	0.37	0.37
Sat Flow, veh/h	1774	3038	470	1774	1810	1535	1675	1827	1575	3375	1649	146
Grp Volume(v), veh/h	145	142	146	152	199	187	25	320	92	353	0	554
Grp Sat Flow(s),veh/h/ln	1774	1750	1758	1774	1810	1535	1675	1827	1575	1688	0	1794
Q Serve(g_s), s	5.1	4.5	4.6	5.4	6.3	7.1	0.9	10.0	2.9	6.6	0.0	18.3
Cycle Q Clear(g_c), s	5.1	4.5	4.6	5.4	6.3	7.1	0.9	10.0	2.9	6.6	0.0	18.3
Prop In Lane	1.00		0.27	1.00		1.00	1.00		1.00	1.00		0.08
Lane Grp Cap(c), veh/h	202	377	378	204	391	332	75	510	440	465	0	668
V/C Ratio(X)	0.72	0.38	0.39	0.75	0.51	0.56	0.33	0.63	0.21	0.76	0.00	0.83
Avail Cap(c_a), veh/h	253	749	752	253	774	657	205	728	628	533	0	778
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	27.9	21.9	21.9	27.9	22.5	22.8	30.2	20.5	18.0	27.1	0.0	18.6
Incr Delay (d2), s/veh	7.1	0.8	0.8	9.0	1.2	1.8	2.6	1.5	0.3	5.5	0.0	6.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	2.2	2.3	3.2	3.3	3.1	0.5	5.2	1.3	3.4	0.0	10.2
LnGrp Delay(d),s/veh	35.0	22.6	22.7	37.0	23.7	24.6	32.8	22.1	18.3	32.5	0.0	25.5
LnGrp LOS	D	C	C	D	C	C	C	C	B	C		C
Approach Vol, veh/h		433			538			437			907	
Approach Delay, s/veh		26.8			27.8			21.9			28.2	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.2	18.2	6.6	29.2	11.1	18.3	12.7	23.1
Change Period (Y+Rc), s	3.7	* 4.2	3.7	4.9	3.7	* 4.2	3.7	4.9
Max Green Setting (Gmax), s	9.3	* 28	8.0	28.3	9.3	* 28	10.3	26.0
Max Q Clear Time (g_c+I1), s	7.4	6.6	2.9	20.3	7.1	9.1	8.6	12.0
Green Ext Time (p_c), s	0.1	4.5	0.0	3.8	0.1	4.3	0.2	5.5

Intersection Summary	
HCM 2010 Ctrl Delay	26.7
HCM 2010 LOS	C

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	93	387	83	115	275	20	140	4	85	15	3	31
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1860	1900	1810	1799	1900	1810	1704	1900	1900	1900	1900
Adj Flow Rate, veh/h	102	425	91	126	302	22	154	4	93	16	3	34
Adj No. of Lanes	1	2	0	1	2	0	2	1	0	1	1	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	0	2	2	5	6	6	5	0	0	0	0	0
Cap, veh/h	131	1617	343	158	1864	135	252	11	261	174	7	81
Arrive On Green	0.07	0.56	0.56	0.09	0.58	0.58	0.08	0.19	0.19	0.05	0.05	0.05
Sat Flow, veh/h	1810	2900	616	1723	3233	234	3343	60	1397	1319	133	1502
Grp Volume(v), veh/h	102	258	258	126	159	165	154	0	97	16	0	37
Grp Sat Flow(s),veh/h/ln	1810	1767	1749	1723	1709	1757	1672	0	1457	1319	0	1635
Q Serve(g_s), s	3.9	5.3	5.4	5.0	3.0	3.1	3.1	0.0	4.1	0.8	0.0	1.5
Cycle Q Clear(g_c), s	3.9	5.3	5.4	5.0	3.0	3.1	3.1	0.0	4.1	0.8	0.0	1.5
Prop In Lane	1.00		0.35	1.00		0.13	1.00		0.96	1.00		0.92
Lane Grp Cap(c), veh/h	131	985	975	158	986	1014	252	0	272	174	0	88
V/C Ratio(X)	0.78	0.26	0.26	0.80	0.16	0.16	0.61	0.00	0.36	0.09	0.00	0.42
Avail Cap(c_a), veh/h	142	985	975	160	986	1014	764	0	333	404	0	374
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.85	0.85	0.85	0.99	0.99	0.99	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	31.9	8.0	8.0	31.2	6.9	6.9	31.4	0.0	24.8	31.7	0.0	32.0
Incr Delay (d2), s/veh	16.8	0.5	0.6	22.0	0.3	0.3	0.9	0.0	0.3	0.2	0.0	3.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.5	2.7	2.7	3.3	1.5	1.6	1.5	0.0	1.6	0.3	0.0	0.8
LnGrp Delay(d),s/veh	48.7	8.6	8.6	53.1	7.3	7.3	32.3	0.0	25.1	31.9	0.0	35.2
LnGrp LOS	D	A	A	D	A	A	C		C	C		D
Approach Vol, veh/h		618			450			251			53	
Approach Delay, s/veh		15.2			20.1			29.5			34.2	
Approach LOS		B			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6		8
Phs Duration (G+Y+Rc), s	9.9	43.0	9.3	7.8	8.6	44.4		17.1
Change Period (Y+Rc), s	3.5	4.0	4.0	4.0	3.5	4.0		4.0
Max Green Setting (Gmax), s	6.5	16.0	16.0	16.0	5.5	17.0		16.0
Max Q Clear Time (g_c+I1), s	7.0	7.4	5.1	3.5	5.9	5.1		6.1
Green Ext Time (p_c), s	0.0	2.5	0.2	0.4	0.0	3.0		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	20.2
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	395	92	61	378	1	32	0	38	0	0	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	0.99		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1820	1900	1845	1845	1900	1900	1638	1712	1900	1900	1900
Adj Flow Rate, veh/h	0	476	111	73	455	1	39	0	46	0	0	0
Adj No. of Lanes	0	2	0	1	2	0	0	1	1	0	1	0
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	0	4	4	3	3	3	0	0	11	0	0	0
Cap, veh/h	0	1848	428	91	2815	6	212	0	80	0	105	0
Arrive On Green	0.00	0.66	0.66	0.05	0.78	0.78	0.06	0.00	0.06	0.00	0.00	0.00
Sat Flow, veh/h	0	2879	646	1757	3588	8	1228	0	1444	0	1900	0
Grp Volume(v), veh/h	0	294	293	73	222	234	39	0	46	0	0	0
Grp Sat Flow(s),veh/h/ln	0	1729	1705	1757	1753	1843	1228	0	1444	0	1900	0
Q Serve(g_s), s	0.0	3.5	3.5	2.1	1.6	1.6	1.5	0.0	1.6	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	3.5	3.5	2.1	1.6	1.6	1.5	0.0	1.6	0.0	0.0	0.0
Prop In Lane	0.00		0.38	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	0	1146	1130	91	1375	1446	212	0	80	0	105	0
V/C Ratio(X)	0.00	0.26	0.26	0.80	0.16	0.16	0.18	0.00	0.57	0.00	0.00	0.00
Avail Cap(c_a), veh/h	0	1146	1130	193	1375	1446	537	0	462	0	608	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.97	0.97	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	3.4	3.4	23.5	1.3	1.3	23.0	0.0	23.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.5	0.5	6.1	0.3	0.2	0.2	0.0	2.4	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.8	1.8	1.1	0.8	0.9	0.5	0.0	0.7	0.0	0.0	0.0
LnGrp Delay(d),s/veh	0.0	3.9	4.0	29.5	1.6	1.6	23.2	0.0	25.4	0.0	0.0	0.0
LnGrp LOS		A	A	C	A	A	C		C			
Approach Vol, veh/h		587			529			85			0	
Approach Delay, s/veh		4.0			5.4			24.4			0.0	
Approach LOS		A			A			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	6.1	37.1		6.8		43.2		6.8
Change Period (Y+Rc), s	3.5	4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s	5.5	17.0		16.0		26.0		16.0
Max Q Clear Time (g_c+I1), s	4.1	5.5		0.0		3.6		3.6
Green Ext Time (p_c), s	0.0	5.5		0.0		7.9		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	6.1
HCM 2010 LOS	A

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	249	0	15	0	1	0	16	14	0	0	31	369
Conflicting Peds, #/hr	2	0	2	0	0	0	2	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	210	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	1	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	92	80	92	92	92	80	80	92	92	80	80
Heavy Vehicles, %	7	0	0	2	2	2	0	7	0	0	0	2
Mvmt Flow	311	0	19	0	1	0	20	18	0	0	39	461

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	3	0	0	2	0	0	24	628	2	14	628	5
Stage 1	-	-	-	-	-	-	2	625	-	3	3	-
Stage 2	-	-	-	-	-	-	22	3	-	11	625	-
Critical Hdwy	4.17	-	-	-	-	-	7.1	6.57	-	7.1	6.5	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.57	-	-	-	-
Follow-up Hdwy	2.263	-	-	-	-	-	3.5	4.063	-	3.5	4	3.318
Pot Cap-1 Maneuver	1587	-	-	-	-	-	993	393	-	1007	402	1078
Stage 1	-	-	-	-	-	-	-	-	-	1025	897	-
Stage 2	-	-	-	-	-	-	1002	883	-	-	-	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1584	-	-	-	-	-	515	315	-	-	322	1074
Mov Cap-2 Maneuver	-	-	-	-	-	-	304	1518	-	-	~ -380	-
Stage 1	-	-	-	-	-	-	-	-	-	822	896	-
Stage 2	-	-	-	-	-	-	546	882	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	7.4	0		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	304	-	1584	-	-	-	-	-	-	1074
HCM Lane V/C Ratio	0.066	-	0.196	-	-	-	-	-	-	0.429
HCM Control Delay (s)	17.7	-	7.8	-	-	0	-	-	-	10.9
HCM Lane LOS	C	-	A	-	-	A	-	-	-	B
HCM 95th %tile Q(veh)	0.2	-	0.7	-	-	-	-	-	-	2.2

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	213	40	129	134	38	50	159	1171	37	16	1632	137
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.94	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1868	1900	1900	1842	1900	1827	1840	1900	1357	1827	1845
Adj Flow Rate, veh/h	220	82	148	128	81	57	183	1346	43	18	1876	0
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	3	0	0	0	9	9	4	3	3	40	4	3
Cap, veh/h	293	98	177	151	81	57	163	1832	58	37	1614	729
Arrive On Green	0.17	0.17	0.17	0.08	0.08	0.08	0.09	0.53	0.53	0.03	0.46	0.00
Sat Flow, veh/h	1757	586	1057	1810	977	688	1740	3456	110	1293	3471	1568
Grp Volume(v), veh/h	220	0	230	128	0	138	183	680	709	18	1876	0
Grp Sat Flow(s),veh/h/ln	1757	0	1643	1810	0	1665	1740	1748	1818	1293	1736	1568
Q Serve(g_s), s	10.6	0.0	12.0	6.2	0.0	7.4	8.3	26.6	26.7	1.2	41.3	0.0
Cycle Q Clear(g_c), s	10.6	0.0	12.0	6.2	0.0	7.4	8.3	26.6	26.7	1.2	41.3	0.0
Prop In Lane	1.00		0.64	1.00		0.41	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	293	0	274	151	0	139	163	927	964	37	1614	729
V/C Ratio(X)	0.75	0.00	0.84	0.85	0.00	1.00	1.13	0.73	0.74	0.49	1.16	0.00
Avail Cap(c_a), veh/h	316	0	296	151	0	139	163	927	964	106	1614	729
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	35.2	0.0	35.8	40.2	0.0	40.7	40.3	16.1	16.1	42.5	23.8	0.0
Incr Delay (d2), s/veh	9.3	0.0	18.2	35.1	0.0	74.9	108.4	3.5	3.4	9.9	80.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.9	0.0	6.8	4.6	0.0	6.2	8.8	13.5	14.1	0.5	37.5	0.0
LnGrp Delay(d),s/veh	44.6	0.0	54.1	75.3	0.0	115.6	148.6	19.5	19.4	52.5	104.2	0.0
LnGrp LOS	D		D	E		F	F	B	B	D	F	
Approach Vol, veh/h		450			266			1572			1894	
Approach Delay, s/veh		49.4			96.2			34.5			103.7	
Approach LOS		D			F			C			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		19.0	12.0	46.2		11.6	6.2	52.0
Change Period (Y+Rc), s		* 4.2	3.7	4.9		4.2	3.7	4.9
Max Green Setting (Gmax), s		* 16	8.3	41.3		7.4	7.3	42.3
Max Q Clear Time (g_c+I1), s		14.0	10.3	43.3		9.4	3.2	28.7
Green Ext Time (p_c), s		0.5	0.0	0.0		0.0	0.0	13.4

Intersection Summary		
HCM 2010 Ctrl Delay		71.4
HCM 2010 LOS		E

Notes

User approved volume balancing among the lanes for turning movement.
* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	402	5	17	18	14	49	19	1409	10	32	1773	702
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.88		1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.99	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1681		1665	1782	1572	1736	3532		1770	3438	1538
Flt Permitted	0.95	1.00		0.95	0.99	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1681		1665	1782	1572	1736	3532		1770	3438	1538
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	467	6	20	21	16	57	22	1638	12	37	2062	816
RTOR Reduction (vph)	0	17	0	0	0	54	0	0	0	0	0	0
Lane Group Flow (vph)	467	9	0	18	19	3	22	1650	0	37	2062	816
Confl. Peds. (#/hr)				1		1			1	1		
Heavy Vehicles (%)	2%	0%	0%	3%	0%	1%	4%	2%	13%	2%	5%	5%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA		Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6						Free
Actuated Green, G (s)	18.9	18.9		6.8	6.8	6.8	4.5	69.7		4.5	70.2	117.8
Effective Green, g (s)	18.9	18.9		6.8	6.8	6.8	4.5	69.7		4.5	70.2	117.8
Actuated g/C Ratio	0.16	0.16		0.06	0.06	0.06	0.04	0.59		0.04	0.60	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)	550	269		96	102	90	66	2089		67	2048	1538
v/s Ratio Prot	c0.14	0.01		0.01	0.01		0.01	0.47		0.02	c0.60	
v/s Ratio Perm						0.00						c0.53
v/c Ratio	0.85	0.03		0.19	0.19	0.04	0.33	0.79		0.55	1.01	0.53
Uniform Delay, d1	48.1	41.7		52.9	52.9	52.4	55.2	18.4		55.7	23.8	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	12.6	0.1		1.6	1.5	0.3	3.0	2.4		9.5	21.6	1.3
Delay (s)	60.6	41.8		54.5	54.4	52.7	58.2	20.8		65.2	45.4	1.3
Level of Service	E	D		D	D	D	E	C		E	D	A
Approach Delay (s)		59.6			53.4			21.3			33.3	
Approach LOS		E			D			C			C	

Intersection Summary				
HCM 2000 Control Delay	32.3	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.97			
Actuated Cycle Length (s)	117.8	Sum of lost time (s)	17.9	
Intersection Capacity Utilization	75.1%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

HCM 2010 Signalized Intersection Summary
9: Carmel Rancho Blvd & Shopping Center Dwy

Cum AM.syn
1/27/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	56	1	19	9	1	20	17	231	15	76	560	174
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		1.00	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1882	1900	1900	1785	1863	1881	1848	1900	1827	1853	1900
Adj Flow Rate, veh/h	73	1	25	12	1	26	22	300	19	99	727	226
Adj No. of Lanes	1	1	0	0	1	1	1	2	0	1	2	0
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Percent Heavy Veh, %	0	0	0	0	0	2	1	3	3	4	3	3
Cap, veh/h	476	7	179	448	24	183	528	1718	108	814	1354	421
Arrive On Green	0.12	0.12	0.12	0.12	0.12	0.12	0.51	0.51	0.51	0.51	0.51	0.51
Sat Flow, veh/h	1392	62	1545	1086	205	1573	592	3354	211	1034	2643	821
Grp Volume(v), veh/h	73	0	26	13	0	26	22	156	163	99	484	469
Grp Sat Flow(s),veh/h/ln	1392	0	1606	1291	0	1573	592	1755	1810	1034	1761	1703
Q Serve(g_s), s	1.1	0.0	0.3	0.0	0.0	0.3	0.6	1.0	1.0	1.2	4.0	4.0
Cycle Q Clear(g_c), s	1.4	0.0	0.3	0.3	0.0	0.3	4.5	1.0	1.0	2.3	4.0	4.0
Prop In Lane	1.00		0.96	0.92		1.00	1.00		0.12	1.00		0.48
Lane Grp Cap(c), veh/h	476	0	187	471	0	183	528	899	927	814	902	873
V/C Ratio(X)	0.15	0.00	0.14	0.03	0.00	0.14	0.04	0.17	0.18	0.12	0.54	0.54
Avail Cap(c_a), veh/h	1607	0	1492	1564	0	1461	692	1386	1428	1100	1390	1345
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	9.2	0.0	8.6	8.5	0.0	8.6	5.1	2.8	2.8	3.4	3.5	3.5
Incr Delay (d2), s/veh	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.1	0.1	0.0	0.1	0.1	0.5	0.5	0.3	1.9	1.9
LnGrp Delay(d),s/veh	9.2	0.0	8.7	8.5	0.0	8.7	5.1	2.8	2.8	3.4	3.7	3.7
LnGrp LOS	A		A	A		A	A	A	A	A	A	A
Approach Vol, veh/h		99			39			341			1052	
Approach Delay, s/veh		9.1			8.6			3.0			3.7	
Approach LOS		A			A			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		6.5		15.0		6.5		15.0
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		20.0		17.0		20.0		17.0
Max Q Clear Time (g_c+I1), s		3.4		6.0		2.3		6.5
Green Ext Time (p_c), s		0.2		4.5		0.2		4.4

Intersection Summary	
HCM 2010 Ctrl Delay	4.0
HCM 2010 LOS	A

HCM Signalized Intersection Capacity Analysis
1: SR 1 & Carmel Valley Rd

Cum PM.syn
1/27/2016

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	0	967	973	105	992	769
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9	4.9	4.9	4.0
Lane Util. Factor		0.88	1.00	1.00	0.97	1.00
Frt		0.85	1.00	0.85	1.00	1.00
Flt Protected		1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		2814	1863	1553	3467	1881
Flt Permitted		1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		2814	1863	1553	3467	1881
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	1029	1035	112	1055	818
RTOR Reduction (vph)	0	104	0	5	0	0
Lane Group Flow (vph)	0	925	1035	107	1055	818
Heavy Vehicles (%)	0%	1%	2%	4%	1%	1%
Turn Type		Over	NA	Perm	Prot	NA
Protected Phases		3	2		3	Free
Permitted Phases				2		
Actuated Green, G (s)		20.1	35.1	35.1	20.1	65.0
Effective Green, g (s)		20.1	35.1	35.1	20.1	65.0
Actuated g/C Ratio		0.31	0.54	0.54	0.31	1.00
Clearance Time (s)		4.9	4.9	4.9	4.9	
Vehicle Extension (s)		4.5	3.5	3.5	4.5	
Lane Grp Cap (vph)		870	1006	838	1072	1881
v/s Ratio Prot		c0.33	c0.56		0.30	0.43
v/s Ratio Perm				0.07		
v/c Ratio		1.06	1.03	0.13	0.98	0.43
Uniform Delay, d1		22.4	14.9	7.4	22.3	0.0
Progression Factor		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		48.9	36.0	0.1	23.6	0.7
Delay (s)		71.3	50.9	7.5	45.9	0.7
Level of Service		E	D	A	D	A
Approach Delay (s)	71.3		46.7			26.2
Approach LOS	E		D			C

Intersection Summary			
HCM 2000 Control Delay	43.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	9.8
Intersection Capacity Utilization	93.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	874	192	399	673	4	276	17	600	4	23	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		0.95	0.95	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	1.00
Satd. Flow (prot)	1805	3539	1615	3467	3571		1715	1729	1599		1887	1553
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	1.00
Satd. Flow (perm)	1805	3539	1615	3467	3571		1715	1729	1599		1887	1553
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	33	930	204	424	716	4	294	18	638	4	24	19
RTOR Reduction (vph)	0	0	120	0	1	0	0	0	536	0	0	19
Lane Group Flow (vph)	33	930	84	424	719	0	156	156	102	0	28	0
Heavy Vehicles (%)	0%	2%	0%	1%	1%	0%	0%	0%	1%	0%	0%	4%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Over	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	7	7	
Permitted Phases			2									7
Actuated Green, G (s)	1.9	23.9	23.9	9.0	31.1		9.2	9.2	9.0		1.6	1.6
Effective Green, g (s)	1.9	23.9	23.9	9.0	31.1		9.2	9.2	9.0		1.6	1.6
Actuated g/C Ratio	0.03	0.37	0.37	0.14	0.49		0.14	0.14	0.14		0.02	0.02
Clearance Time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Vehicle Extension (s)	1.0	1.3	1.3	1.0	1.3		1.0	1.0	1.0		1.0	1.0
Lane Grp Cap (vph)	53	1319	602	486	1732		246	248	224		47	38
v/s Ratio Prot	0.02	c0.26		c0.12	0.20		c0.09	0.09	0.06		c0.01	
v/s Ratio Perm			0.05									0.00
v/c Ratio	0.62	0.71	0.14	0.87	0.42		0.63	0.63	0.45		0.60	0.01
Uniform Delay, d1	30.7	17.1	13.3	27.0	10.6		25.9	25.8	25.3		30.9	30.5
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	15.2	1.4	0.0	15.3	0.1		3.9	3.6	0.5		12.8	0.0
Delay (s)	46.0	18.5	13.3	42.3	10.7		29.8	29.4	25.8		43.7	30.5
Level of Service	D	B	B	D	B		C	C	C		D	C
Approach Delay (s)		18.4			22.4			27.1			38.4	
Approach LOS		B			C			C			D	

Intersection Summary				
HCM 2000 Control Delay	22.6	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.72			
Actuated Cycle Length (s)	64.1	Sum of lost time (s)	20.4	
Intersection Capacity Utilization	76.8%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	143	366	83	190	417	354	162	581	164	328	397	44
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1878	1900	1881	1881	1863	1881	1845	1863	1881	1883	1900
Adj Flow Rate, veh/h	146	373	85	194	426	361	165	593	167	335	405	45
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	2	1	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	1	1	1	1	2	1	3	2	1	1	1
Cap, veh/h	164	865	195	205	604	504	198	553	473	359	487	54
Arrive On Green	0.09	0.30	0.30	0.11	0.32	0.32	0.11	0.30	0.30	0.10	0.29	0.29
Sat Flow, veh/h	1774	2894	652	1792	1881	1571	1792	1845	1575	3476	1664	185
Grp Volume(v), veh/h	146	228	230	194	426	361	165	593	167	335	0	450
Grp Sat Flow(s),veh/h/ln	1774	1784	1763	1792	1881	1571	1792	1845	1575	1738	0	1849
Q Serve(g_s), s	7.3	9.3	9.5	9.7	17.9	18.2	8.1	27.0	7.5	8.6	0.0	20.5
Cycle Q Clear(g_c), s	7.3	9.3	9.5	9.7	17.9	18.2	8.1	27.0	7.5	8.6	0.0	20.5
Prop In Lane	1.00		0.37	1.00		1.00	1.00		1.00	1.00		0.10
Lane Grp Cap(c), veh/h	164	533	527	205	604	504	198	553	473	359	0	541
V/C Ratio(X)	0.89	0.43	0.44	0.95	0.71	0.72	0.83	1.07	0.35	0.93	0.00	0.83
Avail Cap(c_a), veh/h	164	533	527	205	604	504	205	553	473	359	0	541
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	40.4	25.4	25.4	39.6	26.8	26.9	39.2	31.5	24.7	40.0	0.0	29.8
Incr Delay (d2), s/veh	41.0	0.7	0.7	47.6	6.8	8.4	23.7	58.9	0.5	30.8	0.0	10.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.4	4.7	4.7	7.5	10.4	9.0	5.3	22.7	3.3	5.7	0.0	12.0
LnGrp Delay(d),s/veh	81.5	26.0	26.1	87.2	33.6	35.4	62.9	90.4	25.2	70.8	0.0	40.6
LnGrp LOS	F	C	C	F	C	D	E	F	C	E		D
Approach Vol, veh/h		604			981			925			785	
Approach Delay, s/veh		39.5			44.8			73.7			53.5	
Approach LOS		D			D			E			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.0	31.1	13.7	31.2	12.0	33.1	13.0	31.9
Change Period (Y+Rc), s	3.7	* 4.2	3.7	4.9	3.7	* 4.2	3.7	4.9
Max Green Setting (Gmax), s	10.3	* 27	10.3	26.0	8.3	* 29	9.3	27.0
Max Q Clear Time (g_c+I1), s	11.7	11.5	10.1	22.5	9.3	20.2	10.6	29.0
Green Ext Time (p_c), s	0.0	7.6	0.0	2.3	0.0	5.1	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	54.0
HCM 2010 LOS	D

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	177	459	138	163	453	47	348	9	169	43	8	86
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1867	1900	1881	1883	1900	1881	1865	1900	1900	1900	1900
Adj Flow Rate, veh/h	179	464	139	165	458	47	352	9	171	43	8	87
Adj No. of Lanes	1	2	0	1	2	0	2	1	0	1	1	0
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	0	2	2	1	1	1	1	0	0	0	0	0
Cap, veh/h	168	1231	366	166	1497	153	461	23	434	221	13	142
Arrive On Green	0.09	0.46	0.46	0.09	0.46	0.46	0.13	0.29	0.29	0.10	0.10	0.10
Sat Flow, veh/h	1810	2694	801	1792	3276	335	3476	80	1517	1223	136	1481
Grp Volume(v), veh/h	179	304	299	165	249	256	352	0	180	43	0	95
Grp Sat Flow(s),veh/h/ln	1810	1774	1721	1792	1789	1822	1738	0	1597	1223	0	1617
Q Serve(g_s), s	6.5	7.9	8.0	6.4	6.2	6.2	6.8	0.0	6.4	2.3	0.0	3.9
Cycle Q Clear(g_c), s	6.5	7.9	8.0	6.4	6.2	6.2	6.8	0.0	6.4	2.3	0.0	3.9
Prop In Lane	1.00		0.47	1.00		0.18	1.00		0.95	1.00		0.92
Lane Grp Cap(c), veh/h	168	810	787	166	817	833	461	0	457	221	0	156
V/C Ratio(X)	1.07	0.38	0.38	0.99	0.30	0.31	0.76	0.00	0.39	0.19	0.00	0.61
Avail Cap(c_a), veh/h	168	810	787	166	817	833	794	0	457	382	0	370
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.79	0.79	0.79	0.98	0.98	0.98	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	31.8	12.5	12.5	31.7	12.0	12.0	29.3	0.0	20.1	29.6	0.0	30.4
Incr Delay (d2), s/veh	79.9	1.0	1.1	66.6	0.9	0.9	1.0	0.0	0.2	0.4	0.0	3.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.9	4.0	4.0	6.2	3.3	3.3	3.3	0.0	2.8	0.8	0.0	1.9
LnGrp Delay(d),s/veh	111.6	13.5	13.6	98.3	12.9	12.9	30.3	0.0	20.3	30.1	0.0	34.2
LnGrp LOS	F	B	B	F	B	B	C		C	C		C
Approach Vol, veh/h		782			670			532			138	
Approach Delay, s/veh		36.0			34.0			26.9			32.9	
Approach LOS		D			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6		8
Phs Duration (G+Y+Rc), s	10.0	36.0	13.3	10.7	10.0	36.0		24.0
Change Period (Y+Rc), s	3.5	4.0	4.0	4.0	3.5	4.0		4.0
Max Green Setting (Gmax), s	6.5	16.0	16.0	16.0	6.5	16.0		16.0
Max Q Clear Time (g_c+I1), s	8.4	10.0	8.8	5.9	8.5	8.2		8.4
Green Ext Time (p_c), s	0.0	2.6	0.4	0.5	0.0	3.1		0.9

Intersection Summary	
HCM 2010 Ctrl Delay	32.9
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	617	54	85	577	0	86	0	110	0	0	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1900	1863	1881	1900	1900	1881	1900	1900	1900	1900
Adj Flow Rate, veh/h	0	636	56	88	595	0	89	0	113	0	0	0
Adj No. of Lanes	0	2	0	1	2	0	0	1	1	0	1	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	0	2	2	2	1	1	0	0	0	0	0	0
Cap, veh/h	0	1975	174	111	2619	0	297	0	173	0	204	0
Arrive On Green	0.00	0.60	0.60	0.06	0.73	0.00	0.11	0.00	0.11	0.00	0.00	0.00
Sat Flow, veh/h	0	3385	289	1774	3668	0	1422	0	1610	0	1900	0
Grp Volume(v), veh/h	0	342	350	88	595	0	89	0	113	0	0	0
Grp Sat Flow(s),veh/h/ln	0	1770	1812	1774	1787	0	1422	0	1610	0	1900	0
Q Serve(g_s), s	0.0	4.8	4.8	2.4	2.7	0.0	3.0	0.0	3.4	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	4.8	4.8	2.4	2.7	0.0	3.0	0.0	3.4	0.0	0.0	0.0
Prop In Lane	0.00		0.16	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	0	1062	1087	111	2619	0	297	0	173	0	204	0
V/C Ratio(X)	0.00	0.32	0.32	0.79	0.23	0.00	0.30	0.00	0.65	0.00	0.00	0.00
Avail Cap(c_a), veh/h	0	1062	1087	231	2619	0	599	0	515	0	608	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.88	0.88	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	5.0	5.0	23.1	2.1	0.0	21.3	0.0	21.4	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.7	0.7	4.6	0.2	0.0	0.2	0.0	1.6	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	2.5	2.5	1.3	1.3	0.0	1.2	0.0	1.6	0.0	0.0	0.0
LnGrp Delay(d),s/veh	0.0	5.7	5.7	27.7	2.3	0.0	21.5	0.0	23.0	0.0	0.0	0.0
LnGrp LOS		A	A	C	A		C		C			
Approach Vol, veh/h		692			683			202			0	
Approach Delay, s/veh		5.7			5.6			22.3			0.0	
Approach LOS		A			A			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	6.6	34.0		9.4		40.6		9.4
Change Period (Y+Rc), s	3.5	4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s	6.5	16.0		16.0		26.0		16.0
Max Q Clear Time (g_c+I1), s	4.4	6.8		0.0		4.7		5.4
Green Ext Time (p_c), s	0.0	5.9		0.0		10.4		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	7.8
HCM 2010 LOS	A

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	496	0	62	0	1	0	31	23	0	0	20	506
Conflicting Peds, #/hr	0	0	0	0	0	0	2	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	210	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	92	91	92	92	92	91	91	92	92	91	91
Heavy Vehicles, %	2	0	0	0	0	0	4	0	0	0	0	1
Mvmt Flow	545	0	68	0	1	0	34	25	0	0	22	556

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	2	0	0	14	1093	2	16	1093	1
Stage 1	-	-	-	-	-	-	2	1092	-	1	1	-
Stage 2	-	-	-	-	-	-	12	1	-	15	1092	-
Critical Hdwy	4.12	-	-	-	-	-	7.14	6.5	-	7.1	6.5	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.14	5.5	-	-	-	-
Follow-up Hdwy	2.218	-	-	-	-	-	3.536	4	-	3.5	4	3.309
Pot Cap-1 Maneuver	1622	-	-	-	-	-	997	216	-	1004	216	1087
Stage 1	-	-	-	-	-	-	-	-	-	1027	899	-
Stage 2	-	-	-	-	-	-	1003	899	-	-	-	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1622	-	-	-	-	-	531	143	-	-	143	1087
Mov Cap-2 Maneuver	-	-	-	-	-	-	228	~ -283	-	-	~ -32	-
Stage 1	-	-	-	-	-	-	-	-	-	682	899	-
Stage 2	-	-	-	-	-	-	478	899	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	7.4	0		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	228	-	1622	-	-	-	-	-	-	1087
HCM Lane V/C Ratio	0.149	-	0.336	-	-	-	-	-	-	0.512
HCM Control Delay (s)	23.5	-	8.3	-	-	0	-	-	-	11.7
HCM Lane LOS	C	-	A	-	-	A	-	-	-	B
HCM 95th %tile Q(veh)	0.5	-	1.5	-	-	-	-	-	-	3

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	277	22	231	34	13	18	284	1657	10	13	1545	153
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.96	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1871	1900	1863	1763	1900	1900	1845	1900	1900	1881	1881
Adj Flow Rate, veh/h	279	41	243	34	16	19	299	1744	11	14	1626	0
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	7	7	2	5	5	0	3	3	0	1	1
Cap, veh/h	332	43	256	114	46	55	292	1906	12	42	1414	633
Arrive On Green	0.19	0.19	0.19	0.06	0.06	0.06	0.16	0.53	0.53	0.02	0.40	0.00
Sat Flow, veh/h	1774	231	1369	1774	717	852	1810	3571	23	1810	3574	1599
Grp Volume(v), veh/h	279	0	284	34	0	35	299	855	900	14	1626	0
Grp Sat Flow(s),veh/h/ln	1774	0	1600	1774	0	1569	1810	1753	1841	1810	1787	1599
Q Serve(g_s), s	13.5	0.0	15.6	1.6	0.0	1.9	14.3	39.4	39.5	0.7	35.1	0.0
Cycle Q Clear(g_c), s	13.5	0.0	15.6	1.6	0.0	1.9	14.3	39.4	39.5	0.7	35.1	0.0
Prop In Lane	1.00		0.86	1.00		0.54	1.00		0.01	1.00		1.00
Lane Grp Cap(c), veh/h	332	0	299	114	0	101	292	936	983	42	1414	633
V/C Ratio(X)	0.84	0.00	0.95	0.30	0.00	0.35	1.03	0.91	0.92	0.34	1.15	0.00
Avail Cap(c_a), veh/h	332	0	299	140	0	124	292	936	983	149	1414	633
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	34.8	0.0	35.6	39.6	0.0	39.7	37.2	18.8	18.9	42.7	26.8	0.0
Incr Delay (d2), s/veh	17.6	0.0	38.5	2.0	0.0	2.9	59.3	13.5	13.2	4.7	76.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.2	0.0	10.1	0.9	0.0	0.9	11.9	22.3	23.6	0.4	32.0	0.0
LnGrp Delay(d),s/veh	52.3	0.0	74.1	41.6	0.0	42.6	96.6	32.4	32.0	47.3	102.9	0.0
LnGrp LOS	D		E	D		D	F	C	C	D	F	
Approach Vol, veh/h		563			69			2054			1640	
Approach Delay, s/veh		63.3			42.1			41.6			102.4	
Approach LOS		E			D			D			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.8	18.0	40.0		9.9	5.7	52.3
Change Period (Y+Rc), s		* 4.2	3.7	4.9		4.2	3.7	4.9
Max Green Setting (Gmax), s		* 17	14.3	35.1		7.0	7.3	42.1
Max Q Clear Time (g_c+I1), s		17.6	16.3	37.1		3.9	2.7	41.5
Green Ext Time (p_c), s		0.0	0.0	0.0		0.1	0.0	0.6

Intersection Summary	
HCM 2010 Ctrl Delay	67.5
HCM 2010 LOS	E

Notes

User approved volume balancing among the lanes for turning movement.
* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	982	17	17	23	12	52	13	1905	14	54	1736	745
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1723		1715	1775	1615	1805	3535		1805	3574	1583
Flt Permitted	0.95	1.00		0.95	0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1723		1715	1775	1615	1805	3535		1805	3574	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1023	18	18	24	12	54	14	1984	15	56	1808	776
RTOR Reduction (vph)	0	13	0	0	0	51	0	1	0	0	0	0
Lane Group Flow (vph)	1023	23	0	18	18	3	14	1998	0	56	1808	776
Heavy Vehicles (%)	2%	0%	4%	0%	0%	0%	0%	2%	3%	0%	1%	2%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA		Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6						Free
Actuated Green, G (s)	42.7	42.7		7.0	7.0	7.0	3.1	67.3		6.3	71.0	141.2
Effective Green, g (s)	42.7	42.7		7.0	7.0	7.0	3.1	67.3		6.3	71.0	141.2
Actuated g/C Ratio	0.30	0.30		0.05	0.05	0.05	0.02	0.48		0.04	0.50	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)	1038	521		85	87	80	39	1684		80	1797	1583
v/s Ratio Prot	c0.30	0.01		0.01	0.01		0.01	c0.57		0.03	0.51	
v/s Ratio Perm						0.00						c0.49
v/c Ratio	0.99	0.04		0.21	0.21	0.03	0.36	1.19		0.70	1.01	0.49
Uniform Delay, d1	48.9	34.8		64.5	64.4	63.9	68.1	36.9		66.5	35.1	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	24.3	0.1		2.1	2.0	0.3	5.6	90.4		23.4	22.7	1.1
Delay (s)	73.3	34.9		66.6	66.5	64.2	73.6	127.3		90.0	57.8	1.1
Level of Service	E	C		E	E	E	E	F		F	E	A
Approach Delay (s)		72.0			65.1			126.9			41.8	
Approach LOS		E			E			F			D	

Intersection Summary				
HCM 2000 Control Delay	77.2	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	1.07			
Actuated Cycle Length (s)	141.2	Sum of lost time (s)	17.9	
Intersection Capacity Utilization	99.2%	ICU Level of Service	F	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	183	10	20	40	10	30	38	603	18	11	453	89
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.99	0.99		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1887	1900	1900	1800	1863	1881	1846	1900	1827	1851	1900
Adj Flow Rate, veh/h	197	11	22	43	11	32	41	648	19	12	487	96
Adj No. of Lanes	1	1	0	0	1	1	1	2	0	1	2	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	0	0	0	0	2	1	3	3	4	3	3
Cap, veh/h	610	145	290	527	105	407	541	1445	42	503	1215	238
Arrive On Green	0.26	0.26	0.26	0.26	0.26	0.26	0.42	0.42	0.42	0.42	0.42	0.42
Sat Flow, veh/h	1347	558	1117	1016	403	1569	833	3479	102	749	2927	574
Grp Volume(v), veh/h	197	0	33	54	0	32	41	327	340	12	291	292
Grp Sat Flow(s),veh/h/ln	1347	0	1675	1419	0	1569	833	1754	1827	749	1758	1743
Q Serve(g_s), s	3.2	0.0	0.4	0.1	0.0	0.4	0.9	3.3	3.3	0.3	2.9	2.9
Cycle Q Clear(g_c), s	3.8	0.0	0.4	0.6	0.0	0.4	3.8	3.3	3.3	3.6	2.9	2.9
Prop In Lane	1.00		0.67	0.80		1.00	1.00		0.06	1.00		0.33
Lane Grp Cap(c), veh/h	610	0	435	631	0	407	541	728	759	503	730	724
V/C Ratio(X)	0.32	0.00	0.08	0.09	0.00	0.08	0.08	0.45	0.45	0.02	0.40	0.40
Avail Cap(c_a), veh/h	1355	0	1361	1398	0	1275	770	1212	1262	710	1215	1204
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	8.4	0.0	6.9	7.0	0.0	6.9	6.4	5.2	5.2	6.5	5.0	5.1
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	0.0	0.2	0.3	0.0	0.2	0.2	1.6	1.6	0.1	1.4	1.4
LnGrp Delay(d),s/veh	8.5	0.0	6.9	7.0	0.0	6.9	6.4	5.3	5.3	6.5	5.2	5.2
LnGrp LOS	A		A	A		A	A	A	A	A	A	A
Approach Vol, veh/h		230			86			708			595	
Approach Delay, s/veh		8.3			7.0			5.4			5.2	
Approach LOS		A			A			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		10.4		14.2		10.4		14.2
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		20.0		17.0		20.0		17.0
Max Q Clear Time (g_c+I1), s		5.8		5.6		2.6		5.8
Green Ext Time (p_c), s		0.6		4.2		0.6		4.1

Intersection Summary		
HCM 2010 Ctrl Delay	5.8	
HCM 2010 LOS	A	

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	0	855	543	61	1142	835
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9	4.9	4.9	4.0
Lane Util. Factor		0.88	1.00	1.00	0.97	1.00
Frt		0.85	1.00	0.85	1.00	1.00
Flt Protected		1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		2760	1863	1509	3335	1759
Flt Permitted		1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		2760	1863	1509	3335	1759
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	929	590	66	1241	908
RTOR Reduction (vph)	0	205	0	8	0	0
Lane Group Flow (vph)	0	724	590	58	1241	908
Heavy Vehicles (%)	0%	3%	2%	7%	5%	8%
Turn Type		Over	NA	Perm	Prot	NA
Protected Phases		3	2		3	Free
Permitted Phases				2		
Actuated Green, G (s)		25.4	23.5	23.5	25.4	58.7
Effective Green, g (s)		25.4	23.5	23.5	25.4	58.7
Actuated g/C Ratio		0.43	0.40	0.40	0.43	1.00
Clearance Time (s)		4.9	4.9	4.9	4.9	
Vehicle Extension (s)		4.5	3.5	3.5	4.5	
Lane Grp Cap (vph)		1194	745	604	1443	1759
v/s Ratio Prot		0.26	c0.32		c0.37	0.52
v/s Ratio Perm				0.04		
v/c Ratio		0.61	0.79	0.10	0.86	0.52
Uniform Delay, d1		12.8	15.5	11.0	15.0	0.0
Progression Factor		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		1.2	5.9	0.1	5.8	1.1
Delay (s)		14.0	21.4	11.1	20.9	1.1
Level of Service		B	C	B	C	A
Approach Delay (s)	14.0		20.3			12.5
Approach LOS	B		C			B

Intersection Summary			
HCM 2000 Control Delay	14.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	58.7	Sum of lost time (s)	9.8
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	27	773	403	468	734	5	88	5	295	10	17	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		0.95	0.95	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00	1.00		1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.98	1.00
Satd. Flow (prot)	1736	3374	1563	3467	3501		1618	1641	1524		1681	1558
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.98	1.00
Satd. Flow (perm)	1736	3374	1563	3467	3501		1618	1641	1524		1681	1558
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	31	878	458	532	834	6	100	6	335	11	19	38
RTOR Reduction (vph)	0	0	276	0	0	0	0	0	283	0	0	37
Lane Group Flow (vph)	31	878	182	532	840	0	53	53	52	0	30	1
Confl. Peds. (#/hr)	2		1			1	1			1		2
Heavy Vehicles (%)	4%	7%	2%	1%	3%	0%	6%	0%	6%	30%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Over	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	7	7	
Permitted Phases			2									7
Actuated Green, G (s)	1.8	23.4	23.4	9.2	30.9		4.4	4.4	9.2		1.5	1.5
Effective Green, g (s)	1.8	23.4	23.4	9.2	30.9		4.4	4.4	9.2		1.5	1.5
Actuated g/C Ratio	0.03	0.40	0.40	0.16	0.52		0.07	0.07	0.16		0.03	0.03
Clearance Time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Vehicle Extension (s)	1.0	1.3	1.3	1.0	1.3		1.0	1.0	1.0		1.0	1.0
Lane Grp Cap (vph)	53	1340	620	541	1836		120	122	238		42	39
v/s Ratio Prot	0.02	c0.26		c0.15	0.24		c0.03	0.03	0.03		c0.02	
v/s Ratio Perm			0.12									0.00
v/c Ratio	0.58	0.66	0.29	0.98	0.46		0.44	0.43	0.22		0.71	0.02
Uniform Delay, d1	28.2	14.5	12.1	24.8	8.8		26.1	26.1	21.7		28.5	28.0
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	10.2	0.9	0.1	34.1	0.1		0.9	0.9	0.2		38.0	0.1
Delay (s)	38.3	15.4	12.2	58.9	8.8		27.0	27.0	21.9		66.5	28.1
Level of Service	D	B	B	E	A		C	C	C		E	C
Approach Delay (s)		14.8			28.2			23.1			45.0	
Approach LOS		B			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	22.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	58.9	Sum of lost time (s)	20.4
Intersection Capacity Utilization	56.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	133	230	36	142	185	177	23	294	86	326	468	41
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1842	1900	1863	1810	1827	1759	1827	1863	1827	1821	1900
Adj Flow Rate, veh/h	145	250	39	154	201	192	25	320	93	354	509	45
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	2	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	3	3	2	5	4	8	4	2	4	4	4
Cap, veh/h	201	662	102	203	396	336	75	510	439	463	612	54
Arrive On Green	0.11	0.22	0.22	0.11	0.22	0.22	0.04	0.28	0.28	0.14	0.37	0.37
Sat Flow, veh/h	1774	3040	468	1774	1810	1535	1675	1827	1575	3375	1649	146
Grp Volume(v), veh/h	145	143	146	154	201	192	25	320	93	354	0	554
Grp Sat Flow(s),veh/h/ln	1774	1750	1758	1774	1810	1535	1675	1827	1575	1688	0	1794
Q Serve(g_s), s	5.2	4.5	4.7	5.5	6.4	7.3	0.9	10.0	3.0	6.6	0.0	18.4
Cycle Q Clear(g_c), s	5.2	4.5	4.7	5.5	6.4	7.3	0.9	10.0	3.0	6.6	0.0	18.4
Prop In Lane	1.00		0.27	1.00		1.00	1.00		1.00	1.00		0.08
Lane Grp Cap(c), veh/h	201	381	383	203	396	336	75	510	439	463	0	667
V/C Ratio(X)	0.72	0.37	0.38	0.76	0.51	0.57	0.33	0.63	0.21	0.77	0.00	0.83
Avail Cap(c_a), veh/h	252	745	748	252	770	653	204	724	624	530	0	774
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	28.1	21.8	21.9	28.1	22.5	22.9	30.4	20.7	18.1	27.3	0.0	18.7
Incr Delay (d2), s/veh	7.3	0.7	0.8	9.9	1.2	1.8	2.6	1.5	0.3	5.8	0.0	7.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	2.3	2.3	3.3	3.3	3.3	0.5	5.3	1.3	3.5	0.0	10.4
LnGrp Delay(d),s/veh	35.4	22.6	22.6	38.1	23.7	24.7	33.0	22.2	18.4	33.0	0.0	25.8
LnGrp LOS	D	C	C	D	C	C	C	C	B	C		C
Approach Vol, veh/h		434			547			438			908	
Approach Delay, s/veh		26.9			28.1			22.0			28.6	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.2	18.5	6.6	29.3	11.1	18.6	12.7	23.2
Change Period (Y+Rc), s	3.7	* 4.2	3.7	4.9	3.7	* 4.2	3.7	4.9
Max Green Setting (Gmax), s	9.3	* 28	8.0	28.3	9.3	* 28	10.3	26.0
Max Q Clear Time (g_c+I1), s	7.5	6.7	2.9	20.4	7.2	9.3	8.6	12.0
Green Ext Time (p_c), s	0.1	4.5	0.0	3.8	0.1	4.3	0.2	5.5

Intersection Summary	
HCM 2010 Ctrl Delay	26.9
HCM 2010 LOS	C

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	93	390	83	116	284	20	140	4	85	15	3	31
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1860	1900	1810	1799	1900	1810	1704	1900	1900	1900	1900
Adj Flow Rate, veh/h	102	429	91	127	312	22	154	4	93	16	3	34
Adj No. of Lanes	1	2	0	1	2	0	2	1	0	1	1	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	0	2	2	5	6	6	5	0	0	0	0	0
Cap, veh/h	131	1618	341	159	1869	131	252	11	261	174	7	81
Arrive On Green	0.07	0.56	0.56	0.09	0.58	0.58	0.08	0.19	0.19	0.05	0.05	0.05
Sat Flow, veh/h	1810	2905	611	1723	3240	227	3343	60	1397	1319	133	1502
Grp Volume(v), veh/h	102	260	260	127	164	170	154	0	97	16	0	37
Grp Sat Flow(s),veh/h/ln	1810	1767	1750	1723	1709	1758	1672	0	1457	1319	0	1635
Q Serve(g_s), s	3.9	5.3	5.4	5.1	3.1	3.2	3.1	0.0	4.1	0.8	0.0	1.5
Cycle Q Clear(g_c), s	3.9	5.3	5.4	5.1	3.1	3.2	3.1	0.0	4.1	0.8	0.0	1.5
Prop In Lane	1.00		0.35	1.00		0.13	1.00		0.96	1.00		0.92
Lane Grp Cap(c), veh/h	131	984	974	159	986	1014	252	0	272	174	0	88
V/C Ratio(X)	0.78	0.26	0.27	0.80	0.17	0.17	0.61	0.00	0.36	0.09	0.00	0.42
Avail Cap(c_a), veh/h	142	984	974	160	986	1014	764	0	333	404	0	374
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.85	0.85	0.85	0.99	0.99	0.99	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	31.9	8.1	8.1	31.1	6.9	6.9	31.4	0.0	24.8	31.7	0.0	32.0
Incr Delay (d2), s/veh	16.8	0.6	0.6	22.2	0.4	0.4	0.9	0.0	0.3	0.2	0.0	3.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.5	2.7	2.8	3.4	1.6	1.6	1.5	0.0	1.6	0.3	0.0	0.8
LnGrp Delay(d),s/veh	48.7	8.6	8.6	53.4	7.3	7.3	32.3	0.0	25.1	31.9	0.0	35.2
LnGrp LOS	D	A	A	D	A	A	C		C	C		D
Approach Vol, veh/h		622			461			251			53	
Approach Delay, s/veh		15.2			20.0			29.5			34.2	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6		8
Phs Duration (G+Y+Rc), s	10.0	43.0	9.3	7.8	8.6	44.4		17.1
Change Period (Y+Rc), s	3.5	4.0	4.0	4.0	3.5	4.0		4.0
Max Green Setting (Gmax), s	6.5	16.0	16.0	16.0	5.5	17.0		16.0
Max Q Clear Time (g_c+I1), s	7.1	7.4	5.1	3.5	5.9	5.2		6.1
Green Ext Time (p_c), s	0.0	2.5	0.2	0.4	0.0	3.0		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	20.1
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	398	92	62	388	1	32	0	38	0	0	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	0.99		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1820	1900	1845	1845	1900	1900	1638	1712	1900	1900	1900
Adj Flow Rate, veh/h	0	480	111	75	467	1	39	0	46	0	0	0
Adj No. of Lanes	0	2	0	1	2	0	0	1	1	0	1	0
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	0	4	4	3	3	3	0	0	11	0	0	0
Cap, veh/h	0	1847	425	94	2815	6	212	0	80	0	105	0
Arrive On Green	0.00	0.66	0.66	0.05	0.78	0.78	0.06	0.00	0.06	0.00	0.00	0.00
Sat Flow, veh/h	0	2884	642	1757	3588	8	1228	0	1444	0	1900	0
Grp Volume(v), veh/h	0	296	295	75	228	240	39	0	46	0	0	0
Grp Sat Flow(s),veh/h/ln	0	1729	1706	1757	1753	1843	1228	0	1444	0	1900	0
Q Serve(g_s), s	0.0	3.5	3.5	2.1	1.6	1.6	1.5	0.0	1.6	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	3.5	3.5	2.1	1.6	1.6	1.5	0.0	1.6	0.0	0.0	0.0
Prop In Lane	0.00		0.38	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	0	1144	1128	94	1375	1446	212	0	80	0	105	0
V/C Ratio(X)	0.00	0.26	0.26	0.80	0.17	0.17	0.18	0.00	0.57	0.00	0.00	0.00
Avail Cap(c_a), veh/h	0	1144	1128	193	1375	1446	537	0	462	0	608	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.97	0.97	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	3.5	3.5	23.4	1.3	1.3	23.0	0.0	23.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.5	0.5	5.8	0.3	0.2	0.2	0.0	2.4	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.8	1.8	1.2	0.9	0.9	0.5	0.0	0.7	0.0	0.0	0.0
LnGrp Delay(d),s/veh	0.0	4.0	4.0	29.2	1.6	1.6	23.2	0.0	25.4	0.0	0.0	0.0
LnGrp LOS		A	A	C	A	A	C		C			
Approach Vol, veh/h		591			543			85			0	
Approach Delay, s/veh		4.0			5.4			24.4			0.0	
Approach LOS		A			A			C				
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	6.2	37.1		6.8		43.2		6.8				
Change Period (Y+Rc), s	3.5	4.0		4.0		4.0		4.0				
Max Green Setting (Gmax), s	5.5	17.0		16.0		26.0		16.0				
Max Q Clear Time (g_c+I1), s	4.1	5.5		0.0		3.6		3.6				
Green Ext Time (p_c), s	0.0	5.6		0.0		8.1		0.1				

Intersection Summary	
HCM 2010 Ctrl Delay	6.1
HCM 2010 LOS	A

Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	249	0	18	0	1	0	27	19	0	0	34	369
Conflicting Peds, #/hr	2	0	2	0	0	0	2	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	210	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	1	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	92	80	92	92	92	80	80	92	92	80	80
Heavy Vehicles, %	7	0	0	2	2	2	0	7	0	0	0	2
Mvmt Flow	311	0	22	0	1	0	34	24	0	0	42	461

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	3	0	0	2	0	0	26	628	2	17	628	5
Stage 1	-	-	-	-	-	-	2	625	-	3	3	-
Stage 2	-	-	-	-	-	-	24	3	-	14	625	-
Critical Hdwy	4.17	-	-	-	-	-	7.1	6.57	-	7.1	6.5	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.57	-	-	-	-
Follow-up Hdwy	2.263	-	-	-	-	-	3.5	4.063	-	3.5	4	3.318
Pot Cap-1 Maneuver	1587	-	-	-	-	-	990	393	-	1003	402	1078
Stage 1	-	-	-	-	-	-	-	-	-	1025	897	-
Stage 2	-	-	-	-	-	-	999	883	-	-	-	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1584	-	-	-	-	-	517	315	-	-	322	1074
Mov Cap-2 Maneuver	-	-	-	-	-	-	304	1518	-	-	~ -380	-
Stage 1	-	-	-	-	-	-	-	-	-	822	896	-
Stage 2	-	-	-	-	-	-	542	882	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	7.3	0		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	304	-	1584	-	-	-	-	-	-	1074
HCM Lane V/C Ratio	0.111	-	0.196	-	-	-	-	-	-	0.429
HCM Control Delay (s)	18.3	-	7.8	-	-	0	-	-	-	10.9
HCM Lane LOS	C	-	A	-	-	A	-	-	-	B
HCM 95th %tile Q(veh)	0.4	-	0.7	-	-	-	-	-	-	2.2

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	213	40	130	134	38	50	161	1176	37	16	1634	137
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.94	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1868	1900	1900	1842	1900	1827	1840	1900	1357	1827	1845
Adj Flow Rate, veh/h	220	81	149	128	81	57	185	1352	43	18	1878	0
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	3	0	0	0	9	9	4	3	3	40	4	3
Cap, veh/h	294	97	178	151	81	57	163	1832	58	37	1614	729
Arrive On Green	0.17	0.17	0.17	0.08	0.08	0.08	0.09	0.53	0.53	0.03	0.46	0.00
Sat Flow, veh/h	1757	578	1063	1810	977	688	1740	3457	110	1293	3471	1568
Grp Volume(v), veh/h	220	0	230	128	0	138	185	683	712	18	1878	0
Grp Sat Flow(s),veh/h/ln	1757	0	1641	1810	0	1665	1740	1748	1819	1293	1736	1568
Q Serve(g_s), s	10.6	0.0	12.1	6.2	0.0	7.4	8.3	26.8	26.9	1.2	41.3	0.0
Cycle Q Clear(g_c), s	10.6	0.0	12.1	6.2	0.0	7.4	8.3	26.8	26.9	1.2	41.3	0.0
Prop In Lane	1.00		0.65	1.00		0.41	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	294	0	274	151	0	139	163	927	964	37	1614	729
V/C Ratio(X)	0.75	0.00	0.84	0.85	0.00	1.00	1.14	0.74	0.74	0.49	1.16	0.00
Avail Cap(c_a), veh/h	316	0	296	151	0	139	163	927	964	106	1614	729
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	35.2	0.0	35.8	40.2	0.0	40.7	40.3	16.1	16.1	42.5	23.8	0.0
Incr Delay (d2), s/veh	9.3	0.0	18.3	35.1	0.0	75.0	112.6	3.5	3.4	9.9	81.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.9	0.0	6.8	4.6	0.0	6.2	9.0	13.6	14.4	0.5	37.6	0.0
LnGrp Delay(d),s/veh	44.5	0.0	54.1	75.3	0.0	115.7	152.8	19.6	19.6	52.5	104.7	0.0
LnGrp LOS	D		D	E		F	F	B	B	D	F	
Approach Vol, veh/h		450			266			1580			1896	
Approach Delay, s/veh		49.4			96.2			35.2			104.2	
Approach LOS		D			F			D			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		19.0	12.0	46.2		11.6	6.2	52.0
Change Period (Y+Rc), s		* 4.2	3.7	4.9		4.2	3.7	4.9
Max Green Setting (Gmax), s		* 16	8.3	41.3		7.4	7.3	42.3
Max Q Clear Time (g_c+I1), s		14.1	10.3	43.3		9.4	3.2	28.9
Green Ext Time (p_c), s		0.5	0.0	0.0		0.0	0.0	13.3

Intersection Summary	
HCM 2010 Ctrl Delay	71.8
HCM 2010 LOS	E

Notes

User approved volume balancing among the lanes for turning movement.
* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	402	5	17	18	14	49	19	1414	10	32	1775	702
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.88		1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.99	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1681		1665	1782	1572	1736	3532		1770	3438	1538
Flt Permitted	0.95	1.00		0.95	0.99	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1681		1665	1782	1572	1736	3532		1770	3438	1538
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	467	6	20	21	16	57	22	1644	12	37	2064	816
RTOR Reduction (vph)	0	17	0	0	0	54	0	0	0	0	0	0
Lane Group Flow (vph)	467	9	0	18	19	3	22	1656	0	37	2064	816
Confl. Peds. (#/hr)				1		1			1	1		
Heavy Vehicles (%)	2%	0%	0%	3%	0%	1%	4%	2%	13%	2%	5%	5%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA		Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6						Free
Actuated Green, G (s)	18.9	18.9		6.8	6.8	6.8	4.5	69.7		4.5	70.2	117.8
Effective Green, g (s)	18.9	18.9		6.8	6.8	6.8	4.5	69.7		4.5	70.2	117.8
Actuated g/C Ratio	0.16	0.16		0.06	0.06	0.06	0.04	0.59		0.04	0.60	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)	550	269		96	102	90	66	2089		67	2048	1538
v/s Ratio Prot	c0.14	0.01		0.01	0.01		0.01	0.47		0.02	c0.60	
v/s Ratio Perm						0.00						c0.53
v/c Ratio	0.85	0.03		0.19	0.19	0.04	0.33	0.79		0.55	1.01	0.53
Uniform Delay, d1	48.1	41.7		52.9	52.9	52.4	55.2	18.5		55.7	23.8	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	12.6	0.1		1.6	1.5	0.3	3.0	2.5		9.5	21.8	1.3
Delay (s)	60.6	41.8		54.5	54.4	52.7	58.2	21.0		65.2	45.6	1.3
Level of Service	E	D		D	D	D	E	C		E	D	A
Approach Delay (s)		59.6			53.4			21.4			33.5	
Approach LOS		E			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	32.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	117.8	Sum of lost time (s)	17.9
Intersection Capacity Utilization	75.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM 2010 Signalized Intersection Summary
9: Carmel Rancho Blvd & Shopping Center Dwy

Cum + Proj AM.syn
1/27/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	56	1	19	9	1	20	18	235	15	76	563	174
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		1.00	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1882	1900	1900	1785	1863	1881	1848	1900	1827	1853	1900
Adj Flow Rate, veh/h	73	1	25	12	1	26	23	305	19	99	731	226
Adj No. of Lanes	1	1	0	0	1	1	1	2	0	1	2	0
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Percent Heavy Veh, %	0	0	0	0	0	2	1	3	3	4	3	3
Cap, veh/h	474	7	179	446	24	182	527	1725	107	812	1360	420
Arrive On Green	0.12	0.12	0.12	0.12	0.12	0.12	0.51	0.51	0.51	0.51	0.51	0.51
Sat Flow, veh/h	1392	62	1545	1086	204	1573	589	3357	208	1029	2646	818
Grp Volume(v), veh/h	73	0	26	13	0	26	23	159	165	99	486	471
Grp Sat Flow(s),veh/h/ln	1392	0	1606	1290	0	1573	589	1755	1810	1029	1761	1704
Q Serve(g_s), s	1.1	0.0	0.3	0.0	0.0	0.3	0.6	1.0	1.1	1.2	4.0	4.0
Cycle Q Clear(g_c), s	1.4	0.0	0.3	0.3	0.0	0.3	4.6	1.0	1.1	2.3	4.0	4.0
Prop In Lane	1.00		0.96	0.92		1.00	1.00		0.11	1.00		0.48
Lane Grp Cap(c), veh/h	474	0	186	470	0	182	527	902	930	812	905	876
V/C Ratio(X)	0.15	0.00	0.14	0.03	0.00	0.14	0.04	0.18	0.18	0.12	0.54	0.54
Avail Cap(c_a), veh/h	1601	0	1486	1558	0	1455	687	1380	1423	1092	1384	1340
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	9.2	0.0	8.6	8.5	0.0	8.6	5.1	2.8	2.8	3.4	3.5	3.5
Incr Delay (d2), s/veh	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.1	0.1	0.0	0.1	0.1	0.5	0.5	0.3	1.9	1.9
LnGrp Delay(d),s/veh	9.3	0.0	8.7	8.5	0.0	8.7	5.1	2.8	2.8	3.4	3.7	3.7
LnGrp LOS	A		A	A		A	A	A	A	A	A	A
Approach Vol, veh/h		99			39			347			1056	
Approach Delay, s/veh		9.1			8.7			3.0			3.7	
Approach LOS		A			A			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		6.5		15.1		6.5		15.1
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		20.0		17.0		20.0		17.0
Max Q Clear Time (g_c+I1), s		3.4		6.0		2.3		6.6
Green Ext Time (p_c), s		0.2		4.5		0.2		4.4

Intersection Summary	
HCM 2010 Ctrl Delay	4.0
HCM 2010 LOS	A

HCM Signalized Intersection Capacity Analysis
1: SR 1 & Carmel Valley Rd

Cum + Proj PM.syn
1/27/2016

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	0	968	977	105	994	774
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9	4.9	4.9	4.0
Lane Util. Factor		0.88	1.00	1.00	0.97	1.00
Frt		0.85	1.00	0.85	1.00	1.00
Flt Protected		1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		2814	1863	1553	3467	1881
Flt Permitted		1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		2814	1863	1553	3467	1881
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	1030	1039	112	1057	823
RTOR Reduction (vph)	0	103	0	5	0	0
Lane Group Flow (vph)	0	927	1039	107	1057	823
Heavy Vehicles (%)	0%	1%	2%	4%	1%	1%
Turn Type		Over	NA	Perm	Prot	NA
Protected Phases		3	2		3	Free
Permitted Phases				2		
Actuated Green, G (s)		20.1	35.1	35.1	20.1	65.0
Effective Green, g (s)		20.1	35.1	35.1	20.1	65.0
Actuated g/C Ratio		0.31	0.54	0.54	0.31	1.00
Clearance Time (s)		4.9	4.9	4.9	4.9	
Vehicle Extension (s)		4.5	3.5	3.5	4.5	
Lane Grp Cap (vph)		870	1006	838	1072	1881
v/s Ratio Prot		c0.33	c0.56		0.30	0.44
v/s Ratio Perm				0.07		
v/c Ratio		1.07	1.03	0.13	0.99	0.44
Uniform Delay, d1		22.4	14.9	7.4	22.3	0.0
Progression Factor		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		49.5	37.1	0.1	24.0	0.7
Delay (s)		72.0	52.1	7.5	46.3	0.7
Level of Service		E	D	A	D	A
Approach Delay (s)	72.0		47.8			26.4
Approach LOS	E		D			C

Intersection Summary			
HCM 2000 Control Delay	44.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	9.8
Intersection Capacity Utilization	93.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	874	194	402	673	4	277	17	602	4	23	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		0.95	0.95	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	1.00
Satd. Flow (prot)	1805	3539	1615	3467	3571		1715	1728	1599		1887	1553
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	1.00
Satd. Flow (perm)	1805	3539	1615	3467	3571		1715	1728	1599		1887	1553
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	33	930	206	428	716	4	295	18	640	4	24	19
RTOR Reduction (vph)	0	0	122	0	1	0	0	0	536	0	0	19
Lane Group Flow (vph)	33	930	84	428	719	0	156	157	104	0	28	0
Heavy Vehicles (%)	0%	2%	0%	1%	1%	0%	0%	0%	1%	0%	0%	4%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Over	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	7	7	
Permitted Phases			2									7
Actuated Green, G (s)	1.9	23.9	23.9	9.0	31.1		9.2	9.2	9.0		1.6	1.6
Effective Green, g (s)	1.9	23.9	23.9	9.0	31.1		9.2	9.2	9.0		1.6	1.6
Actuated g/C Ratio	0.03	0.37	0.37	0.14	0.49		0.14	0.14	0.14		0.02	0.02
Clearance Time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Vehicle Extension (s)	1.0	1.3	1.3	1.0	1.3		1.0	1.0	1.0		1.0	1.0
Lane Grp Cap (vph)	53	1319	602	486	1732		246	248	224		47	38
v/s Ratio Prot	0.02	c0.26		c0.12	0.20		c0.09	0.09	0.06		c0.01	
v/s Ratio Perm			0.05									0.00
v/c Ratio	0.62	0.71	0.14	0.88	0.42		0.63	0.63	0.46		0.60	0.01
Uniform Delay, d1	30.7	17.1	13.3	27.0	10.6		25.9	25.9	25.3		30.9	30.5
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	15.2	1.4	0.0	16.4	0.1		3.9	3.8	0.6		12.8	0.0
Delay (s)	46.0	18.5	13.3	43.4	10.7		29.8	29.7	25.9		43.7	30.5
Level of Service	D	B	B	D	B		C	C	C		D	C
Approach Delay (s)		18.4			22.9			27.1			38.4	
Approach LOS		B			C			C			D	

Intersection Summary				
HCM 2000 Control Delay	22.7	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.72			
Actuated Cycle Length (s)	64.1	Sum of lost time (s)	20.4	
Intersection Capacity Utilization	76.9%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	143	369	83	191	419	358	162	581	166	333	397	44
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1878	1900	1881	1881	1863	1881	1845	1863	1881	1883	1900
Adj Flow Rate, veh/h	146	377	85	195	428	365	165	593	169	340	405	45
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	2	1	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	1	1	1	1	2	1	3	2	1	1	1
Cap, veh/h	164	867	193	205	604	504	198	553	473	359	487	54
Arrive On Green	0.09	0.30	0.30	0.11	0.32	0.32	0.11	0.30	0.30	0.10	0.29	0.29
Sat Flow, veh/h	1774	2900	647	1792	1881	1571	1792	1845	1575	3476	1664	185
Grp Volume(v), veh/h	146	230	232	195	428	365	165	593	169	340	0	450
Grp Sat Flow(s),veh/h/ln	1774	1784	1764	1792	1881	1571	1792	1845	1575	1738	0	1849
Q Serve(g_s), s	7.3	9.4	9.5	9.7	18.0	18.5	8.1	27.0	7.6	8.8	0.0	20.5
Cycle Q Clear(g_c), s	7.3	9.4	9.5	9.7	18.0	18.5	8.1	27.0	7.6	8.8	0.0	20.5
Prop In Lane	1.00		0.37	1.00		1.00	1.00		1.00	1.00		0.10
Lane Grp Cap(c), veh/h	164	533	527	205	604	504	198	553	473	359	0	541
V/C Ratio(X)	0.89	0.43	0.44	0.95	0.71	0.72	0.83	1.07	0.36	0.95	0.00	0.83
Avail Cap(c_a), veh/h	164	533	527	205	604	504	205	553	473	359	0	541
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	40.4	25.4	25.5	39.6	26.8	27.0	39.2	31.5	24.7	40.1	0.0	29.8
Incr Delay (d2), s/veh	41.0	0.7	0.7	48.9	6.9	8.7	23.7	58.9	0.6	33.8	0.0	10.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.4	4.7	4.7	7.6	10.4	9.2	5.3	22.7	3.4	5.9	0.0	12.0
LnGrp Delay(d),s/veh	81.5	26.1	26.2	88.5	33.7	35.7	62.9	90.4	25.3	73.9	0.0	40.6
LnGrp LOS	F	C	C	F	C	D	E	F	C	E		D
Approach Vol, veh/h		608			988			927			790	
Approach Delay, s/veh		39.4			45.3			73.6			54.9	
Approach LOS		D			D			E			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.0	31.1	13.7	31.2	12.0	33.1	13.0	31.9
Change Period (Y+Rc), s	3.7	* 4.2	3.7	4.9	3.7	* 4.2	3.7	4.9
Max Green Setting (Gmax), s	10.3	* 27	10.3	26.0	8.3	* 29	9.3	27.0
Max Q Clear Time (g_c+I1), s	11.7	11.5	10.1	22.5	9.3	20.5	10.8	29.0
Green Ext Time (p_c), s	0.0	7.6	0.0	2.3	0.0	5.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	54.4
HCM 2010 LOS	D

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	177	469	138	163	460	47	348	9	170	43	8	86
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1867	1900	1881	1883	1900	1881	1865	1900	1900	1900	1900
Adj Flow Rate, veh/h	179	474	139	165	465	47	352	9	172	43	8	87
Adj No. of Lanes	1	2	0	1	2	0	2	1	0	1	1	0
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	0	2	2	1	1	1	1	0	0	0	0	0
Cap, veh/h	168	1238	360	166	1499	151	461	23	434	220	13	142
Arrive On Green	0.09	0.46	0.46	0.09	0.46	0.46	0.13	0.29	0.29	0.10	0.10	0.10
Sat Flow, veh/h	1810	2708	789	1792	3281	330	3476	79	1517	1222	136	1481
Grp Volume(v), veh/h	179	309	304	165	253	259	352	0	181	43	0	95
Grp Sat Flow(s),veh/h/ln	1810	1774	1724	1792	1789	1823	1738	0	1597	1222	0	1617
Q Serve(g_s), s	6.5	8.0	8.1	6.4	6.3	6.3	6.8	0.0	6.4	2.3	0.0	3.9
Cycle Q Clear(g_c), s	6.5	8.0	8.1	6.4	6.3	6.3	6.8	0.0	6.4	2.3	0.0	3.9
Prop In Lane	1.00		0.46	1.00		0.18	1.00		0.95	1.00		0.92
Lane Grp Cap(c), veh/h	168	810	788	166	817	833	461	0	457	220	0	156
V/C Ratio(X)	1.07	0.38	0.39	0.99	0.31	0.31	0.76	0.00	0.40	0.20	0.00	0.61
Avail Cap(c_a), veh/h	168	810	788	166	817	833	794	0	457	382	0	370
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.78	0.78	0.78	0.98	0.98	0.98	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	31.8	12.5	12.5	31.7	12.0	12.0	29.3	0.0	20.1	29.6	0.0	30.4
Incr Delay (d2), s/veh	79.6	1.1	1.1	66.5	1.0	1.0	1.0	0.0	0.2	0.4	0.0	3.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.9	4.1	4.1	6.2	3.3	3.4	3.3	0.0	2.8	0.8	0.0	1.9
LnGrp Delay(d),s/veh	111.3	13.6	13.6	98.3	13.0	13.0	30.3	0.0	20.3	30.1	0.0	34.2
LnGrp LOS	F	B	B	F	B	B	C		C	C		C
Approach Vol, veh/h		792			677			533			138	
Approach Delay, s/veh		35.7			33.8			26.9			32.9	
Approach LOS		D			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6		8
Phs Duration (G+Y+Rc), s	10.0	36.0	13.3	10.7	10.0	36.0		24.0
Change Period (Y+Rc), s	3.5	4.0	4.0	4.0	3.5	4.0		4.0
Max Green Setting (Gmax), s	6.5	16.0	16.0	16.0	6.5	16.0		16.0
Max Q Clear Time (g_c+I1), s	8.4	10.1	8.8	5.9	8.5	8.3		8.4
Green Ext Time (p_c), s	0.0	2.6	0.4	0.5	0.0	3.2		0.9

Intersection Summary	
HCM 2010 Ctrl Delay	32.7
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	628	54	85	584	0	86	0	111	0	0	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1900	1863	1881	1900	1900	1881	1900	1900	1900	1900
Adj Flow Rate, veh/h	0	647	56	88	602	0	89	0	114	0	0	0
Adj No. of Lanes	0	2	0	1	2	0	0	1	1	0	1	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	0	2	2	2	1	1	0	0	0	0	0	0
Cap, veh/h	0	1976	171	111	2617	0	297	0	174	0	205	0
Arrive On Green	0.00	0.60	0.60	0.06	0.73	0.00	0.11	0.00	0.11	0.00	0.00	0.00
Sat Flow, veh/h	0	3390	285	1774	3668	0	1422	0	1611	0	1900	0
Grp Volume(v), veh/h	0	347	356	88	602	0	89	0	114	0	0	0
Grp Sat Flow(s),veh/h/ln	0	1770	1812	1774	1787	0	1422	0	1611	0	1900	0
Q Serve(g_s), s	0.0	4.9	4.9	2.4	2.7	0.0	3.0	0.0	3.4	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	4.9	4.9	2.4	2.7	0.0	3.0	0.0	3.4	0.0	0.0	0.0
Prop In Lane	0.00		0.16	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	0	1060	1086	111	2617	0	297	0	174	0	205	0
V/C Ratio(X)	0.00	0.33	0.33	0.79	0.23	0.00	0.30	0.00	0.66	0.00	0.00	0.00
Avail Cap(c_a), veh/h	0	1060	1086	231	2617	0	599	0	515	0	608	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.88	0.88	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	5.0	5.0	23.1	2.2	0.0	21.2	0.0	21.4	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.7	0.7	4.6	0.2	0.0	0.2	0.0	1.6	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	2.5	2.6	1.3	1.3	0.0	1.2	0.0	1.6	0.0	0.0	0.0
LnGrp Delay(d),s/veh	0.0	5.7	5.7	27.7	2.4	0.0	21.4	0.0	23.0	0.0	0.0	0.0
LnGrp LOS		A	A	C	A		C		C			
Approach Vol, veh/h		703			690			203			0	
Approach Delay, s/veh		5.7			5.6			22.3			0.0	
Approach LOS		A			A			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	6.6	34.0		9.4		40.6		9.4
Change Period (Y+Rc), s	3.5	4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s	6.5	16.0		16.0		26.0		16.0
Max Q Clear Time (g_c+I1), s	4.4	6.9		0.0		4.7		5.4
Green Ext Time (p_c), s	0.0	5.9		0.0		10.5		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	7.8
HCM 2010 LOS	A

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	496	0	74	0	1	0	38	27	0	0	27	506
Conflicting Peds, #/hr	0	0	0	0	0	0	2	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	210	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	92	91	92	92	92	91	91	92	92	91	91
Heavy Vehicles, %	2	0	0	0	0	0	4	0	0	0	0	1
Mvmt Flow	545	0	81	0	1	0	42	30	0	0	30	556

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	2	0	0	18	1093	2	18	1093	1
Stage 1	-	-	-	-	-	-	2	1092	-	1	1	-
Stage 2	-	-	-	-	-	-	16	1	-	17	1092	-
Critical Hdwy	4.12	-	-	-	-	-	7.14	6.5	-	7.1	6.5	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.14	5.5	-	-	-	-
Follow-up Hdwy	2.218	-	-	-	-	-	3.536	4	-	3.5	4	3.309
Pot Cap-1 Maneuver	1622	-	-	-	-	-	991	216	-	1001	216	1087
Stage 1	-	-	-	-	-	-	-	-	-	1027	899	-
Stage 2	-	-	-	-	-	-	998	899	-	-	-	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1622	-	-	-	-	-	585	143	-	-	143	1087
Mov Cap-2 Maneuver	-	-	-	-	-	-	251	~ -283	-	-	~ -32	-
Stage 1	-	-	-	-	-	-	-	-	-	682	899	-
Stage 2	-	-	-	-	-	-	471	899	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	7.3	0		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	251	-	1622	-	-	-	-	-	-	1087
HCM Lane V/C Ratio	0.166	-	0.336	-	-	-	-	-	-	0.512
HCM Control Delay (s)	22.2	-	8.3	-	-	0	-	-	-	11.7
HCM Lane LOS	C	-	A	-	-	A	-	-	-	B
HCM 95th %tile Q(veh)	0.6	-	1.5	-	-	-	-	-	-	3

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	277	22	233	34	13	18	285	1661	10	13	1550	153
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.96	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1871	1900	1863	1763	1900	1900	1845	1900	1900	1881	1881
Adj Flow Rate, veh/h	280	40	245	34	16	19	300	1748	11	14	1632	0
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	7	7	2	5	5	0	3	3	0	1	1
Cap, veh/h	332	42	257	114	46	55	292	1906	12	42	1414	633
Arrive On Green	0.19	0.19	0.19	0.06	0.06	0.06	0.16	0.53	0.53	0.02	0.40	0.00
Sat Flow, veh/h	1774	224	1375	1774	717	852	1810	3571	22	1810	3574	1599
Grp Volume(v), veh/h	280	0	285	34	0	35	300	857	902	14	1632	0
Grp Sat Flow(s),veh/h/ln	1774	0	1599	1774	0	1569	1810	1753	1841	1810	1787	1599
Q Serve(g_s), s	13.5	0.0	15.6	1.6	0.0	1.9	14.3	39.6	39.7	0.7	35.1	0.0
Cycle Q Clear(g_c), s	13.5	0.0	15.6	1.6	0.0	1.9	14.3	39.6	39.7	0.7	35.1	0.0
Prop In Lane	1.00		0.86	1.00		0.54	1.00		0.01	1.00		1.00
Lane Grp Cap(c), veh/h	332	0	299	114	0	101	292	936	983	42	1414	633
V/C Ratio(X)	0.84	0.00	0.95	0.30	0.00	0.35	1.03	0.92	0.92	0.34	1.15	0.00
Avail Cap(c_a), veh/h	332	0	299	140	0	124	292	936	983	149	1414	633
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	34.8	0.0	35.7	39.6	0.0	39.7	37.2	18.9	18.9	42.7	26.8	0.0
Incr Delay (d2), s/veh	17.9	0.0	39.4	2.0	0.0	2.9	60.3	13.8	13.4	4.7	77.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.3	0.0	10.2	0.9	0.0	0.9	11.9	22.6	23.7	0.4	32.4	0.0
LnGrp Delay(d),s/veh	52.7	0.0	75.1	41.6	0.0	42.6	97.5	32.7	32.3	47.3	104.7	0.0
LnGrp LOS	D		E	D		D	F	C	C	D	F	
Approach Vol, veh/h		565			69			2059			1646	
Approach Delay, s/veh		64.0			42.1			42.0			104.2	
Approach LOS		E			D			D			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.8	18.0	40.0		9.9	5.7	52.3
Change Period (Y+Rc), s		* 4.2	3.7	4.9		4.2	3.7	4.9
Max Green Setting (Gmax), s		* 17	14.3	35.1		7.0	7.3	42.1
Max Q Clear Time (g_c+I1), s		17.6	16.3	37.1		3.9	2.7	41.7
Green Ext Time (p_c), s		0.0	0.0	0.0		0.1	0.0	0.4

Intersection Summary	
HCM 2010 Ctrl Delay	68.4
HCM 2010 LOS	E

Notes

User approved volume balancing among the lanes for turning movement.
* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	982	17	17	23	12	52	13	1909	14	54	1741	745
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1723		1715	1775	1615	1805	3535		1805	3574	1583
Flt Permitted	0.95	1.00		0.95	0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1723		1715	1775	1615	1805	3535		1805	3574	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1023	18	18	24	12	54	14	1989	15	56	1814	776
RTOR Reduction (vph)	0	13	0	0	0	51	0	1	0	0	0	0
Lane Group Flow (vph)	1023	23	0	18	18	3	14	2003	0	56	1814	776
Heavy Vehicles (%)	2%	0%	4%	0%	0%	0%	0%	2%	3%	0%	1%	2%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA		Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6						Free
Actuated Green, G (s)	42.7	42.7		7.0	7.0	7.0	3.1	67.3		6.3	71.0	141.2
Effective Green, g (s)	42.7	42.7		7.0	7.0	7.0	3.1	67.3		6.3	71.0	141.2
Actuated g/C Ratio	0.30	0.30		0.05	0.05	0.05	0.02	0.48		0.04	0.50	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)	1038	521		85	87	80	39	1684		80	1797	1583
v/s Ratio Prot	c0.30	0.01		0.01	0.01		0.01	c0.57		0.03	0.51	
v/s Ratio Perm						0.00						c0.49
v/c Ratio	0.99	0.04		0.21	0.21	0.03	0.36	1.19		0.70	1.01	0.49
Uniform Delay, d1	48.9	34.8		64.5	64.4	63.9	68.1	36.9		66.5	35.1	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	24.3	0.1		2.1	2.0	0.3	5.6	91.6		23.4	23.6	1.1
Delay (s)	73.3	34.9		66.6	66.5	64.2	73.6	128.6		90.0	58.7	1.1
Level of Service	E	C		E	E	E	E	F		F	E	A
Approach Delay (s)		72.0			65.1			128.2			42.4	
Approach LOS		E			E			F			D	

Intersection Summary				
HCM 2000 Control Delay	77.9	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	1.08			
Actuated Cycle Length (s)	141.2	Sum of lost time (s)	17.9	
Intersection Capacity Utilization	99.3%	ICU Level of Service	F	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	183	10	22	40	10	30	39	606	18	11	458	89
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.99	0.99		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1887	1900	1900	1800	1863	1881	1846	1900	1827	1851	1900
Adj Flow Rate, veh/h	197	11	24	43	11	32	42	652	19	12	492	96
Adj No. of Lanes	1	1	0	0	1	1	1	2	0	1	2	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	0	0	0	0	2	1	3	3	4	3	3
Cap, veh/h	609	136	298	525	105	408	538	1450	42	502	1222	237
Arrive On Green	0.26	0.26	0.26	0.26	0.26	0.26	0.42	0.42	0.42	0.42	0.42	0.42
Sat Flow, veh/h	1347	525	1145	1015	402	1569	830	3480	101	747	2933	569
Grp Volume(v), veh/h	197	0	35	54	0	32	42	328	343	12	294	294
Grp Sat Flow(s),veh/h/ln	1347	0	1669	1417	0	1569	830	1754	1827	747	1758	1744
Q Serve(g_s), s	3.2	0.0	0.4	0.1	0.0	0.4	0.9	3.3	3.3	0.3	2.9	2.9
Cycle Q Clear(g_c), s	3.8	0.0	0.4	0.6	0.0	0.4	3.9	3.3	3.3	3.6	2.9	2.9
Prop In Lane	1.00		0.69	0.80		1.00	1.00		0.06	1.00		0.33
Lane Grp Cap(c), veh/h	609	0	434	630	0	408	538	731	761	502	732	726
V/C Ratio(X)	0.32	0.00	0.08	0.09	0.00	0.08	0.08	0.45	0.45	0.02	0.40	0.40
Avail Cap(c_a), veh/h	1348	0	1350	1389	0	1268	763	1205	1256	704	1208	1198
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	8.4	0.0	6.9	7.0	0.0	6.9	6.4	5.2	5.2	6.5	5.1	5.1
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	0.0	0.2	0.3	0.0	0.2	0.2	1.6	1.7	0.1	1.4	1.4
LnGrp Delay(d),s/veh	8.6	0.0	6.9	7.0	0.0	6.9	6.4	5.3	5.3	6.5	5.2	5.2
LnGrp LOS	A		A	A		A	A	A	A	A	A	A
Approach Vol, veh/h		232			86			713			600	
Approach Delay, s/veh		8.3			7.0			5.4			5.2	
Approach LOS		A			A			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		10.4		14.3		10.4		14.3
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		20.0		17.0		20.0		17.0
Max Q Clear Time (g_c+I1), s		5.8		5.6		2.6		5.9
Green Ext Time (p_c), s		0.6		4.2		0.6		4.1

Intersection Summary		
HCM 2010 Ctrl Delay	5.8	
HCM 2010 LOS	A	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	133	222	36	126	179	155	23	228	82	298	355	41
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1842	1900	1863	1810	1827	1759	1836	1900	1827	1827	1759
Adj Flow Rate, veh/h	145	241	39	137	195	168	25	248	89	324	386	45
Adj No. of Lanes	1	2	0	1	1	2	1	2	0	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	3	3	2	5	4	8	4	4	4	4	8
Cap, veh/h	220	658	105	217	391	583	77	565	197	519	605	491
Arrive On Green	0.12	0.22	0.22	0.12	0.22	0.22	0.05	0.22	0.22	0.15	0.33	0.33
Sat Flow, veh/h	1774	3023	483	1774	1810	2701	1675	2532	885	3375	1827	1484
Grp Volume(v), veh/h	145	138	142	137	195	168	25	169	168	324	386	45
Grp Sat Flow(s),veh/h/ln	1774	1750	1756	1774	1810	1351	1675	1744	1673	1688	1827	1484
Q Serve(g_s), s	4.5	3.9	4.0	4.3	5.5	3.0	0.8	4.8	5.1	5.2	10.4	1.2
Cycle Q Clear(g_c), s	4.5	3.9	4.0	4.3	5.5	3.0	0.8	4.8	5.1	5.2	10.4	1.2
Prop In Lane	1.00		0.27	1.00		1.00	1.00		0.53	1.00		1.00
Lane Grp Cap(c), veh/h	220	381	382	217	391	583	77	389	373	519	605	491
V/C Ratio(X)	0.66	0.36	0.37	0.63	0.50	0.29	0.33	0.43	0.45	0.62	0.64	0.09
Avail Cap(c_a), veh/h	283	838	841	283	867	1294	230	779	747	597	887	721
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.3	19.4	19.4	24.3	20.1	19.1	26.9	19.5	19.6	23.1	16.5	13.4
Incr Delay (d2), s/veh	3.6	0.7	0.7	3.0	1.2	0.3	2.4	0.9	1.0	1.6	1.4	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	2.0	2.0	2.3	2.9	1.1	0.4	2.4	2.4	2.5	5.5	0.5
LnGrp Delay(d),s/veh	27.9	20.1	20.1	27.3	21.3	19.4	29.4	20.4	20.6	24.7	17.9	13.5
LnGrp LOS	C	C	C	C	C	B	C	C	C	C	B	B
Approach Vol, veh/h		425			500			362			755	
Approach Delay, s/veh		22.8			22.3			21.1			20.6	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.8	16.9	6.4	24.2	10.9	16.8	12.7	17.9
Change Period (Y+Rc), s	3.7	* 4.2	3.7	4.9	3.7	* 4.2	3.7	4.9
Max Green Setting (Gmax), s	9.3	* 28	8.0	28.3	9.3	* 28	10.3	26.0
Max Q Clear Time (g_c+I1), s	6.3	6.0	2.8	12.4	6.5	7.5	7.2	7.1
Green Ext Time (p_c), s	0.1	4.4	0.0	4.5	0.1	4.3	0.3	4.8

Intersection Summary		
HCM 2010 Ctrl Delay		21.5
HCM 2010 LOS		C

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	402	5	17	18	14	49	19	1234	10	32	1569	702
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9	4.9	4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1681		1665	1782	1572	1736	3539	1395	1770	3438	1538
Flt Permitted	0.95	1.00		0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1681		1665	1782	1572	1736	3539	1395	1770	3438	1538
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	467	6	20	21	16	57	22	1435	12	37	1824	816
RTOR Reduction (vph)	0	17	0	0	0	54	0	0	5	0	0	0
Lane Group Flow (vph)	467	9	0	18	19	3	22	1435	7	37	1824	816
Confl. Peds. (#/hr)				1		1			1	1		
Heavy Vehicles (%)	2%	0%	0%	3%	0%	1%	4%	2%	13%	2%	5%	5%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6			8			Free
Actuated Green, G (s)	18.9	18.9		6.8	6.8	6.8	4.5	69.6	69.6	4.5	70.1	117.7
Effective Green, g (s)	18.9	18.9		6.8	6.8	6.8	4.5	69.6	69.6	4.5	70.1	117.7
Actuated g/C Ratio	0.16	0.16		0.06	0.06	0.06	0.04	0.59	0.59	0.04	0.60	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9	4.9	4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0	5.0	3.0	5.0	
Lane Grp Cap (vph)	551	269		96	102	90	66	2092	824	67	2047	1538
v/s Ratio Prot	c0.14	0.01		0.01	0.01		0.01	0.41		0.02	c0.53	
v/s Ratio Perm						0.00			0.01			c0.53
v/c Ratio	0.85	0.03		0.19	0.19	0.04	0.33	0.69	0.01	0.55	0.89	0.53
Uniform Delay, d1	48.0	41.7		52.8	52.8	52.4	55.1	16.5	9.9	55.6	20.5	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	12.4	0.1		1.6	1.5	0.3	3.0	1.2	0.0	9.5	5.7	1.3
Delay (s)	60.4	41.8		54.5	54.3	52.6	58.1	17.8	9.9	65.1	26.2	1.3
Level of Service	E	D		D	D	D	E	B	A	E	C	A
Approach Delay (s)		59.4			53.3			18.3			19.2	
Approach LOS		E			D			B			B	

Intersection Summary				
HCM 2000 Control Delay	23.8	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.89			
Actuated Cycle Length (s)	117.7	Sum of lost time (s)	17.9	
Intersection Capacity Utilization	69.4%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	143	350	83	167	402	298	162	427	157	268	309	44
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1878	1900	1881	1881	1863	1881	1849	1900	1881	1881	1900
Adj Flow Rate, veh/h	146	357	85	170	410	304	165	436	160	273	315	45
Adj No. of Lanes	1	2	0	1	1	2	1	2	0	2	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	1	1	1	1	2	1	3	3	1	1	0
Cap, veh/h	177	950	223	206	652	959	201	626	228	374	459	390
Arrive On Green	0.10	0.33	0.33	0.11	0.35	0.35	0.11	0.25	0.25	0.11	0.24	0.24
Sat Flow, veh/h	1774	2868	675	1792	1881	2767	1792	2522	917	3476	1881	1598
Grp Volume(v), veh/h	146	220	222	170	410	304	165	303	293	273	315	45
Grp Sat Flow(s),veh/h/ln	1774	1784	1759	1792	1881	1383	1792	1757	1681	1738	1881	1598
Q Serve(g_s), s	6.7	7.9	8.0	7.7	15.2	6.7	7.5	13.0	13.3	6.3	12.7	1.8
Cycle Q Clear(g_c), s	6.7	7.9	8.0	7.7	15.2	6.7	7.5	13.0	13.3	6.3	12.7	1.8
Prop In Lane	1.00		0.38	1.00		1.00	1.00		0.55	1.00		1.00
Lane Grp Cap(c), veh/h	177	591	582	206	652	959	201	436	418	374	459	390
V/C Ratio(X)	0.83	0.37	0.38	0.83	0.63	0.32	0.82	0.69	0.70	0.73	0.69	0.12
Avail Cap(c_a), veh/h	177	591	582	221	652	959	221	569	544	388	586	498
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.8	21.3	21.3	36.1	22.8	20.0	36.2	28.5	28.5	36.0	28.6	24.5
Incr Delay (d2), s/veh	26.5	0.5	0.5	20.9	4.6	0.9	20.0	2.8	3.2	6.6	2.6	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.6	3.9	4.0	5.0	8.7	2.7	4.8	6.6	6.5	3.4	6.9	0.8
LnGrp Delay(d),s/veh	63.3	21.8	21.8	57.0	27.3	20.9	56.2	31.3	31.7	42.6	31.3	24.7
LnGrp LOS	E	C	C	E	C	C	E	C	C	D	C	C
Approach Vol, veh/h		588			884			761			633	
Approach Delay, s/veh		32.1			30.8			36.9			35.7	
Approach LOS		C			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.3	31.8	13.0	25.3	12.0	33.1	12.7	25.6
Change Period (Y+Rc), s	3.7	* 4.2	3.7	4.9	3.7	* 4.2	3.7	4.9
Max Green Setting (Gmax), s	10.3	* 27	10.3	26.0	8.3	* 29	9.3	27.0
Max Q Clear Time (g_c+I1), s	9.7	10.0	9.5	14.7	8.7	17.2	8.3	15.3
Green Ext Time (p_c), s	0.0	7.6	0.0	4.7	0.0	6.1	0.1	4.8

Intersection Summary		
HCM 2010 Ctrl Delay	33.8	
HCM 2010 LOS	C	

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	982	17	17	23	12	52	13	1623	14	54	1475	745
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9	4.9	4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1723		1715	1775	1615	1805	3539	1568	1805	3574	1583
Flt Permitted	0.95	1.00		0.95	0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1723		1715	1775	1615	1805	3539	1568	1805	3574	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1023	18	18	24	12	54	14	1691	15	56	1536	776
RTOR Reduction (vph)	0	13	0	0	0	51	0	0	8	0	0	0
Lane Group Flow (vph)	1023	23	0	18	18	3	14	1691	7	56	1536	776
Heavy Vehicles (%)	2%	0%	4%	0%	0%	0%	0%	2%	3%	0%	1%	2%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6			8			Free
Actuated Green, G (s)	42.3	42.3		7.0	7.0	7.0	3.1	67.8	67.8	6.2	71.4	141.2
Effective Green, g (s)	42.3	42.3		7.0	7.0	7.0	3.1	67.8	67.8	6.2	71.4	141.2
Actuated g/C Ratio	0.30	0.30		0.05	0.05	0.05	0.02	0.48	0.48	0.04	0.51	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9	4.9	4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0	5.0	3.0	5.0	
Lane Grp Cap (vph)	1028	516		85	87	80	39	1699	752	79	1807	1583
v/s Ratio Prot	c0.30	0.01		0.01	0.01		0.01	c0.48		0.03	0.43	
v/s Ratio Perm						0.00			0.00			c0.49
v/c Ratio	1.00	0.05		0.21	0.21	0.03	0.36	1.00	0.01	0.71	0.85	0.49
Uniform Delay, d1	49.3	35.1		64.5	64.4	63.9	68.1	36.5	19.2	66.6	30.3	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	26.8	0.1		2.1	2.0	0.3	5.6	20.6	0.0	25.1	4.4	1.1
Delay (s)	76.1	35.2		66.6	66.5	64.2	73.6	57.2	19.2	91.7	34.7	1.1
Level of Service	E	D		E	E	E	E	E	B	F	C	A
Approach Delay (s)		74.7			65.1			57.0			25.0	
Approach LOS		E			E			E			C	

Intersection Summary			
HCM 2000 Control Delay	46.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	141.2	Sum of lost time (s)	17.9
Intersection Capacity Utilization	91.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	133	222	36	133	179	155	23	233	82	298	355	41
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1842	1900	1863	1810	1827	1759	1836	1900	1827	1827	1759
Adj Flow Rate, veh/h	145	241	39	145	195	168	25	253	89	324	386	45
Adj No. of Lanes	1	2	0	1	1	2	1	2	0	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	3	3	2	5	4	8	4	4	4	4	8
Cap, veh/h	220	652	104	220	390	583	77	571	196	518	606	493
Arrive On Green	0.12	0.22	0.22	0.12	0.22	0.22	0.05	0.22	0.22	0.15	0.33	0.33
Sat Flow, veh/h	1774	3023	482	1774	1810	2701	1675	2546	873	3375	1827	1484
Grp Volume(v), veh/h	145	138	142	145	195	168	25	171	171	324	386	45
Grp Sat Flow(s),veh/h/ln	1774	1750	1756	1774	1810	1351	1675	1744	1675	1688	1827	1484
Q Serve(g_s), s	4.6	3.9	4.0	4.6	5.5	3.0	0.8	4.9	5.1	5.2	10.4	1.2
Cycle Q Clear(g_c), s	4.6	3.9	4.0	4.6	5.5	3.0	0.8	4.9	5.1	5.2	10.4	1.2
Prop In Lane	1.00		0.27	1.00		1.00	1.00		0.52	1.00		1.00
Lane Grp Cap(c), veh/h	220	377	379	220	390	583	77	391	376	518	606	493
V/C Ratio(X)	0.66	0.37	0.37	0.66	0.50	0.29	0.33	0.44	0.45	0.63	0.64	0.09
Avail Cap(c_a), veh/h	283	806	809	313	865	1291	230	777	746	596	886	720
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.4	19.5	19.5	24.4	20.1	19.1	27.0	19.5	19.6	23.1	16.5	13.4
Incr Delay (d2), s/veh	3.7	0.7	0.7	3.3	1.2	0.3	2.4	0.9	1.0	1.6	1.3	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	2.0	2.0	2.4	2.9	1.1	0.4	2.5	2.5	2.5	5.5	0.5
LnGrp Delay(d),s/veh	28.0	20.2	20.3	27.7	21.3	19.5	29.4	20.4	20.6	24.8	17.9	13.5
LnGrp LOS	C	C	C	C	C	B	C	C	C	C	B	B
Approach Vol, veh/h		425			508			367			755	
Approach Delay, s/veh		22.9			22.5			21.1			20.6	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.9	16.8	6.4	24.3	10.9	16.8	12.7	18.0
Change Period (Y+Rc), s	3.7	* 4.2	3.7	4.9	3.7	* 4.2	3.7	4.9
Max Green Setting (Gmax), s	10.3	* 27	8.0	28.3	9.3	* 28	10.3	26.0
Max Q Clear Time (g_c+I1), s	6.6	6.0	2.8	12.4	6.6	7.5	7.2	7.1
Green Ext Time (p_c), s	0.1	4.4	0.0	4.5	0.1	4.3	0.3	4.8

Intersection Summary		
HCM 2010 Ctrl Delay		21.6
HCM 2010 LOS		C

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	402	5	17	18	14	49	19	1295	10	32	1620	702
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9	4.9	4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1681		1665	1782	1572	1736	3539	1395	1770	3438	1538
Flt Permitted	0.95	1.00		0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1681		1665	1782	1572	1736	3539	1395	1770	3438	1538
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	467	6	20	21	16	57	22	1506	12	37	1884	816
RTOR Reduction (vph)	0	17	0	0	0	54	0	0	5	0	0	0
Lane Group Flow (vph)	467	9	0	18	19	3	22	1506	7	37	1884	816
Confl. Peds. (#/hr)				1		1			1	1		
Heavy Vehicles (%)	2%	0%	0%	3%	0%	1%	4%	2%	13%	2%	5%	5%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6			8			Free
Actuated Green, G (s)	18.4	18.4		6.9	6.9	6.9	4.6	70.6	70.6	4.5	71.0	118.3
Effective Green, g (s)	18.4	18.4		6.9	6.9	6.9	4.6	70.6	70.6	4.5	71.0	118.3
Actuated g/C Ratio	0.16	0.16		0.06	0.06	0.06	0.04	0.60	0.60	0.04	0.60	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9	4.9	4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0	5.0	3.0	5.0	
Lane Grp Cap (vph)	533	261		97	103	91	67	2112	832	67	2063	1538
v/s Ratio Prot	c0.14	0.01		0.01	0.01		0.01	0.43		0.02	c0.55	
v/s Ratio Perm						0.00			0.01			c0.53
v/c Ratio	0.88	0.03		0.19	0.18	0.04	0.33	0.71	0.01	0.55	0.91	0.53
Uniform Delay, d1	48.8	42.4		53.0	53.0	52.6	55.3	16.7	9.7	55.9	20.9	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	15.7	0.1		1.6	1.5	0.3	2.9	1.4	0.0	9.5	7.1	1.3
Delay (s)	64.6	42.5		54.6	54.5	52.8	58.2	18.2	9.7	65.4	28.0	1.3
Level of Service	E	D		D	D	D	E	B	A	E	C	A
Approach Delay (s)		63.4			53.5			18.7			20.5	
Approach LOS		E			D			B			C	

Intersection Summary				
HCM 2000 Control Delay	24.9	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.91			
Actuated Cycle Length (s)	118.3	Sum of lost time (s)	17.9	
Intersection Capacity Utilization	70.8%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	143	350	83	176	402	298	162	437	157	268	309	44
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1878	1900	1881	1881	1863	1881	1849	1900	1881	1881	1900
Adj Flow Rate, veh/h	146	357	85	180	410	304	165	446	160	273	315	45
Adj No. of Lanes	1	2	0	1	1	2	1	2	0	2	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	1	1	1	1	2	1	3	3	1	1	0
Cap, veh/h	176	931	219	216	650	956	200	635	226	373	463	393
Arrive On Green	0.10	0.32	0.32	0.12	0.35	0.35	0.11	0.25	0.25	0.11	0.25	0.25
Sat Flow, veh/h	1774	2868	675	1792	1881	2767	1792	2538	903	3476	1881	1599
Grp Volume(v), veh/h	146	220	222	180	410	304	165	308	298	273	315	45
Grp Sat Flow(s),veh/h/ln	1774	1784	1759	1792	1881	1383	1792	1757	1684	1738	1881	1599
Q Serve(g_s), s	6.8	8.0	8.1	8.2	15.2	6.8	7.5	13.3	13.5	6.4	12.7	1.8
Cycle Q Clear(g_c), s	6.8	8.0	8.1	8.2	15.2	6.8	7.5	13.3	13.5	6.4	12.7	1.8
Prop In Lane	1.00		0.38	1.00		1.00	1.00		0.54	1.00		1.00
Lane Grp Cap(c), veh/h	176	579	571	216	650	956	200	440	422	373	463	393
V/C Ratio(X)	0.83	0.38	0.39	0.83	0.63	0.32	0.82	0.70	0.71	0.73	0.68	0.11
Avail Cap(c_a), veh/h	176	579	571	221	650	956	221	567	544	387	585	497
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.0	21.8	21.8	36.0	22.9	20.1	36.3	28.5	28.6	36.1	28.6	24.5
Incr Delay (d2), s/veh	26.9	0.5	0.5	22.9	4.6	0.9	20.1	3.0	3.4	6.7	2.6	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.6	4.0	4.0	5.4	8.7	2.7	4.8	6.8	6.6	3.4	6.9	0.8
LnGrp Delay(d),s/veh	63.9	22.3	22.3	58.9	27.5	21.0	56.5	31.5	31.9	42.8	31.2	24.6
LnGrp LOS	E	C	C	E	C	C	E	C	C	D	C	C
Approach Vol, veh/h		588			894			771			633	
Approach Delay, s/veh		32.6			31.6			37.0			35.7	
Approach LOS		C			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.8	31.3	13.1	25.5	12.0	33.1	12.7	25.8
Change Period (Y+Rc), s	3.7	* 4.2	3.7	4.9	3.7	* 4.2	3.7	4.9
Max Green Setting (Gmax), s	10.3	* 27	10.3	26.0	8.3	* 29	9.3	27.0
Max Q Clear Time (g_c+I1), s	10.2	10.1	9.5	14.7	8.8	17.2	8.4	15.5
Green Ext Time (p_c), s	0.0	7.5	0.0	4.7	0.0	6.0	0.1	4.8

Intersection Summary		
HCM 2010 Ctrl Delay	34.2	
HCM 2010 LOS	C	

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	982	17	17	23	12	52	13	1691	14	54	1551	745
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9	4.9	4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1723		1715	1775	1615	1805	3539	1568	1805	3574	1583
Flt Permitted	0.95	1.00		0.95	0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1723		1715	1775	1615	1805	3539	1568	1805	3574	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1023	18	18	24	12	54	14	1761	15	56	1616	776
RTOR Reduction (vph)	0	13	0	0	0	51	0	0	8	0	0	0
Lane Group Flow (vph)	1023	23	0	18	18	3	14	1761	7	56	1616	776
Heavy Vehicles (%)	2%	0%	4%	0%	0%	0%	0%	2%	3%	0%	1%	2%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6			8			Free
Actuated Green, G (s)	41.3	41.3		7.0	7.0	7.0	3.1	68.8	68.8	6.2	72.4	141.2
Effective Green, g (s)	41.3	41.3		7.0	7.0	7.0	3.1	68.8	68.8	6.2	72.4	141.2
Actuated g/C Ratio	0.29	0.29		0.05	0.05	0.05	0.02	0.49	0.49	0.04	0.51	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9	4.9	4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0	5.0	3.0	5.0	
Lane Grp Cap (vph)	1004	503		85	87	80	39	1724	764	79	1832	1583
v/s Ratio Prot	c0.30	0.01		0.01	0.01		0.01	c0.50		0.03	0.45	
v/s Ratio Perm						0.00			0.00			c0.49
v/c Ratio	1.02	0.05		0.21	0.21	0.03	0.36	1.02	0.01	0.71	0.88	0.49
Uniform Delay, d1	49.9	35.8		64.5	64.4	63.9	68.1	36.2	18.6	66.6	30.6	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	33.2	0.1		2.1	2.0	0.3	5.6	27.3	0.0	25.1	5.8	1.1
Delay (s)	83.2	35.9		66.6	66.5	64.2	73.6	63.5	18.7	91.7	36.4	1.1
Level of Service	F	D		E	E	E	E	E	B	F	D	A
Approach Delay (s)		81.6			65.1			63.2			26.5	
Approach LOS		F			E			E			C	

Intersection Summary			
HCM 2000 Control Delay	50.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	141.2	Sum of lost time (s)	17.9
Intersection Capacity Utilization	92.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	0	855	543	61	1142	835
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9	4.0
Lane Util. Factor		0.88	0.95		0.97	1.00
Frt		0.85	0.98		1.00	1.00
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		2760	3469		3335	1759
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		2760	3469		3335	1759
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	929	590	66	1241	908
RTOR Reduction (vph)	0	183	9	0	0	0
Lane Group Flow (vph)	0	746	647	0	1241	908
Heavy Vehicles (%)	0%	3%	2%	7%	5%	8%
Turn Type		Over	NA		Prot	NA
Protected Phases		3	2		3	Free
Permitted Phases						
Actuated Green, G (s)		25.2	15.9		25.2	50.9
Effective Green, g (s)		25.2	15.9		25.2	50.9
Actuated g/C Ratio		0.50	0.31		0.50	1.00
Clearance Time (s)		4.9	4.9		4.9	
Vehicle Extension (s)		4.5	3.5		4.5	
Lane Grp Cap (vph)		1366	1083		1651	1759
v/s Ratio Prot		0.27	0.19		c0.37	0.52
v/s Ratio Perm						
v/c Ratio		0.55	0.60		0.75	0.52
Uniform Delay, d1		8.9	14.8		10.3	0.0
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		0.7	0.9		2.2	1.1
Delay (s)		9.6	15.7		12.6	1.1
Level of Service		A	B		B	A
Approach Delay (s)	9.6		15.7			7.7
Approach LOS	A		B			A

Intersection Summary			
HCM 2000 Control Delay	9.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	50.9	Sum of lost time (s)	9.8
Intersection Capacity Utilization	57.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	133	230	36	142	185	177	23	294	86	326	468	41
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1842	1900	1863	1810	1827	1759	1835	1900	1827	1827	1759
Adj Flow Rate, veh/h	145	250	39	154	201	192	25	320	93	354	509	45
Adj No. of Lanes	1	2	0	1	1	2	1	2	0	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	3	3	2	5	4	8	4	4	4	4	8
Cap, veh/h	209	647	100	211	388	579	75	698	199	484	657	534
Arrive On Green	0.12	0.21	0.21	0.12	0.21	0.21	0.05	0.26	0.26	0.14	0.36	0.36
Sat Flow, veh/h	1774	3040	468	1774	1810	2701	1675	2674	764	3375	1827	1485
Grp Volume(v), veh/h	145	143	146	154	201	192	25	207	206	354	509	45
Grp Sat Flow(s),veh/h/ln	1774	1750	1758	1774	1810	1351	1675	1743	1695	1688	1827	1485
Q Serve(g_s), s	4.9	4.4	4.5	5.2	6.1	3.8	0.9	6.2	6.4	6.3	15.5	1.3
Cycle Q Clear(g_c), s	4.9	4.4	4.5	5.2	6.1	3.8	0.9	6.2	6.4	6.3	15.5	1.3
Prop In Lane	1.00		0.27	1.00		1.00	1.00		0.45	1.00		1.00
Lane Grp Cap(c), veh/h	209	373	374	211	388	579	75	455	442	484	657	534
V/C Ratio(X)	0.70	0.38	0.39	0.73	0.52	0.33	0.33	0.45	0.47	0.73	0.78	0.08
Avail Cap(c_a), veh/h	264	780	784	264	807	1204	214	724	704	555	826	671
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.5	21.1	21.1	26.6	21.7	20.8	29.0	19.4	19.5	25.6	17.8	13.2
Incr Delay (d2), s/veh	5.6	0.8	0.8	7.5	1.3	0.4	2.5	0.9	0.9	4.2	3.9	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	2.2	2.2	3.0	3.2	1.4	0.5	3.1	3.1	3.2	8.5	0.5
LnGrp Delay(d),s/veh	32.1	21.9	22.0	34.1	23.0	21.2	31.5	20.3	20.4	29.9	21.7	13.3
LnGrp LOS	C	C	C	C	C	C	C	C	C	C	C	B
Approach Vol, veh/h		434			547			438			908	
Approach Delay, s/veh		25.3			25.5			21.0			24.5	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.2	17.5	6.5	27.4	11.1	17.6	12.7	21.2
Change Period (Y+Rc), s	3.7	* 4.2	3.7	4.9	3.7	* 4.2	3.7	4.9
Max Green Setting (Gmax), s	9.3	* 28	8.0	28.3	9.3	* 28	10.3	26.0
Max Q Clear Time (g_c+I1), s	7.2	6.5	2.9	17.5	6.9	8.1	8.3	8.4
Green Ext Time (p_c), s	0.1	4.7	0.0	4.7	0.1	4.5	0.3	6.1

Intersection Summary	
HCM 2010 Ctrl Delay	24.2
HCM 2010 LOS	C

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	402	5	17	18	14	49	19	1414	10	32	1775	702
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9	4.9	4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1681		1665	1782	1572	1736	3539	1395	1770	3438	1538
Flt Permitted	0.95	1.00		0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1681		1665	1782	1572	1736	3539	1395	1770	3438	1538
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	467	6	20	21	16	57	22	1644	12	37	2064	816
RTOR Reduction (vph)	0	17	0	0	0	54	0	0	5	0	0	0
Lane Group Flow (vph)	467	9	0	18	19	3	22	1644	7	37	2064	816
Confl. Peds. (#/hr)				1		1			1	1		
Heavy Vehicles (%)	2%	0%	0%	3%	0%	1%	4%	2%	13%	2%	5%	5%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6			8			Free
Actuated Green, G (s)	17.2	17.2		6.9	6.9	6.9	4.6	71.7	71.7	4.5	72.1	118.2
Effective Green, g (s)	17.2	17.2		6.9	6.9	6.9	4.6	71.7	71.7	4.5	72.1	118.2
Actuated g/C Ratio	0.15	0.15		0.06	0.06	0.06	0.04	0.61	0.61	0.04	0.61	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9	4.9	4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0	5.0	3.0	5.0	
Lane Grp Cap (vph)	499	244		97	104	91	67	2146	846	67	2097	1538
v/s Ratio Prot	c0.14	0.01		0.01	0.01		0.01	0.46		0.02	c0.60	
v/s Ratio Perm						0.00			0.01			c0.53
v/c Ratio	0.94	0.04		0.19	0.18	0.04	0.33	0.77	0.01	0.55	0.98	0.53
Uniform Delay, d1	50.0	43.4		53.0	53.0	52.5	55.3	17.1	9.2	55.9	22.5	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	25.6	0.1		1.6	1.5	0.3	2.9	2.0	0.0	9.5	16.1	1.3
Delay (s)	75.5	43.5		54.6	54.4	52.8	58.2	19.1	9.2	65.4	38.6	1.3
Level of Service	E	D		D	D	D	E	B	A	E	D	A
Approach Delay (s)		73.8			53.5			19.5			28.5	
Approach LOS		E			D			B			C	

Intersection Summary				
HCM 2000 Control Delay	30.4	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.97			
Actuated Cycle Length (s)	118.2	Sum of lost time (s)	17.9	
Intersection Capacity Utilization	75.1%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	0	968	977	105	994	774
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9	4.0
Lane Util. Factor		0.88	0.95		0.97	1.00
Frt		0.85	0.99		1.00	1.00
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		2814	3481		3467	1881
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		2814	3481		3467	1881
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	1030	1039	112	1057	823
RTOR Reduction (vph)	0	95	5	0	0	0
Lane Group Flow (vph)	0	935	1146	0	1057	823
Heavy Vehicles (%)	0%	1%	2%	4%	1%	1%
Turn Type		Over	NA		Prot	NA
Protected Phases		3	2		3	Free
Permitted Phases						
Actuated Green, G (s)		20.3	26.8		20.3	56.9
Effective Green, g (s)		20.3	26.8		20.3	56.9
Actuated g/C Ratio		0.36	0.47		0.36	1.00
Clearance Time (s)		4.9	4.9		4.9	
Vehicle Extension (s)		4.5	3.5		4.5	
Lane Grp Cap (vph)		1003	1639		1236	1881
v/s Ratio Prot		c0.33	c0.33		0.30	0.44
v/s Ratio Perm						
v/c Ratio		0.93	0.70		0.86	0.44
Uniform Delay, d1		17.6	11.9		16.9	0.0
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		15.1	1.4		6.4	0.7
Delay (s)		32.7	13.2		23.4	0.7
Level of Service		C	B		C	A
Approach Delay (s)	32.7		13.2			13.5
Approach LOS	C		B			B

Intersection Summary			
HCM 2000 Control Delay	18.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	56.9	Sum of lost time (s)	9.8
Intersection Capacity Utilization	72.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM 2010 Signalized Intersection Summary
3: SR 1 & Rio Rd

Cum + Proj PM-Miti.syn
1/28/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	143	369	83	191	419	358	162	581	166	333	397	44
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1878	1900	1881	1881	1863	1881	1849	1900	1881	1881	1900
Adj Flow Rate, veh/h	146	377	85	195	428	365	165	593	169	340	405	45
Adj No. of Lanes	1	2	0	1	1	2	1	2	0	2	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	1	1	1	1	2	1	3	3	1	1	0
Cap, veh/h	169	894	199	211	623	916	199	751	213	370	515	438
Arrive On Green	0.10	0.31	0.31	0.12	0.33	0.33	0.11	0.28	0.28	0.11	0.27	0.27
Sat Flow, veh/h	1774	2900	647	1792	1881	2766	1792	2698	767	3476	1881	1600
Grp Volume(v), veh/h	146	230	232	195	428	365	165	386	376	340	405	45
Grp Sat Flow(s),veh/h/ln	1774	1784	1764	1792	1881	1383	1792	1756	1708	1738	1881	1600
Q Serve(g_s), s	7.1	9.0	9.1	9.4	17.2	8.9	7.9	17.7	17.8	8.5	17.4	1.8
Cycle Q Clear(g_c), s	7.1	9.0	9.1	9.4	17.2	8.9	7.9	17.7	17.8	8.5	17.4	1.8
Prop In Lane	1.00		0.37	1.00		1.00	1.00		0.45	1.00		1.00
Lane Grp Cap(c), veh/h	169	550	543	211	623	916	199	489	475	370	515	438
V/C Ratio(X)	0.87	0.42	0.43	0.92	0.69	0.40	0.83	0.79	0.79	0.92	0.79	0.10
Avail Cap(c_a), veh/h	169	550	543	211	623	916	211	543	528	370	560	477
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	38.9	24.0	24.1	38.1	25.3	22.5	38.0	29.1	29.2	38.6	29.3	23.7
Incr Delay (d2), s/veh	34.5	0.6	0.6	40.9	6.1	1.3	22.2	7.3	7.6	27.3	7.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.1	4.5	4.5	7.1	10.0	3.5	5.1	9.6	9.4	5.5	10.0	0.8
LnGrp Delay(d),s/veh	73.5	24.6	24.7	79.0	31.4	23.8	60.2	36.4	36.8	65.9	36.4	23.8
LnGrp LOS	E	C	C	E	C	C	E	D	D	E	D	C
Approach Vol, veh/h		608			988			927			790	
Approach Delay, s/veh		36.4			38.0			40.8			48.4	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.0	31.1	13.4	28.8	12.0	33.1	13.0	29.2
Change Period (Y+Rc), s	3.7	* 4.2	3.7	4.9	3.7	* 4.2	3.7	4.9
Max Green Setting (Gmax), s	10.3	* 27	10.3	26.0	8.3	* 29	9.3	27.0
Max Q Clear Time (g_c+I1), s	11.4	11.1	9.9	19.4	9.1	19.2	10.5	19.8
Green Ext Time (p_c), s	0.0	7.8	0.0	4.0	0.0	5.7	0.0	4.3

Intersection Summary		
HCM 2010 Ctrl Delay		41.0
HCM 2010 LOS		D

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM Signalized Intersection Capacity Analysis
8: SR 1 & Carpenter St

Cum + Proj PM-Miti.syn
1/28/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	982	17	17	23	12	52	13	1909	14	54	1741	745
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9	4.9	4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1723		1715	1775	1615	1805	3539	1568	1805	3574	1583
Flt Permitted	0.95	1.00		0.95	0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1723		1715	1775	1615	1805	3539	1568	1805	3574	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1023	18	18	24	12	54	14	1989	15	56	1814	776
RTOR Reduction (vph)	0	13	0	0	0	51	0	0	7	0	0	0
Lane Group Flow (vph)	1023	23	0	18	18	3	14	1989	8	56	1814	776
Heavy Vehicles (%)	2%	0%	4%	0%	0%	0%	0%	2%	3%	0%	1%	2%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6			8			Free
Actuated Green, G (s)	39.2	39.2		7.0	7.0	7.0	3.1	70.8	70.8	6.2	74.4	141.1
Effective Green, g (s)	39.2	39.2		7.0	7.0	7.0	3.1	70.8	70.8	6.2	74.4	141.1
Actuated g/C Ratio	0.28	0.28		0.05	0.05	0.05	0.02	0.50	0.50	0.04	0.53	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9	4.9	4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0	5.0	3.0	5.0	
Lane Grp Cap (vph)	953	478		85	88	80	39	1775	786	79	1884	1583
v/s Ratio Prot	c0.30	0.01		0.01	0.01		0.01	c0.56		0.03	0.51	
v/s Ratio Perm						0.00			0.00			c0.49
v/c Ratio	1.07	0.05		0.21	0.20	0.03	0.36	1.12	0.01	0.71	0.96	0.49
Uniform Delay, d1	50.9	37.3		64.4	64.4	63.8	68.0	35.1	17.6	66.6	32.0	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	51.0	0.1		2.1	2.0	0.3	5.6	62.4	0.0	25.1	13.3	1.1
Delay (s)	101.9	37.4		66.5	66.4	64.1	73.6	97.6	17.6	91.7	45.3	1.1
Level of Service	F	D		E	E	E	E	F	B	F	D	A
Approach Delay (s)		99.7			65.1			96.8			33.3	
Approach LOS		F			E			F			C	

Intersection Summary				
HCM 2000 Control Delay	67.9	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	1.07			
Actuated Cycle Length (s)	141.1	Sum of lost time (s)	17.9	
Intersection Capacity Utilization	98.9%	ICU Level of Service	F	
Analysis Period (min)	15			

c Critical Lane Group

Appendix F

Road Segment Level of Service Calculation Worksheets

Arterial Level of Service

Existing AM

Seg # Arterial Level of Service: NB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	IV	35	32.3	3.2	35.5	0.27	27.3	A
11	From Shopping Center Dwy to Carmel Valley Rd	IV	35	15.6	28.0	43.6	0.12	9.5	D
	Total	IV		47.9	31.2	79.1	0.38	17.5	C

Arterial Level of Service: SB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	IV	35	19.1	3.6	22.7	0.12	18.3	C
12	From Shopping Center Dwy to Rio Rd	IV	35	32.3	10.2	42.5	0.27	22.9	B
	Total	IV		51.4	13.8	65.2	0.39	21.3	B

Arterial Level of Service: EB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	IV	25	66.1	23.9	90.0	0.43	17.3	C
13	From SR 1 to Crossroads Blvd	IV	25	25.0	6.6	31.6	0.11	12.9	D
14	From Crossroads Blvd to Carmel Center Pl	IV	25	11.0	1.3	12.3	0.04	12.2	D
15	From Carmel Center Pl to Carmel Rancho Blvd	IV	25	30.1	7.7	37.8	0.17	16.1	C
	Total			132.2	39.5	171.7	0.76	15.8	C

Arterial Level of Service: WB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	IV	25	30.1	2.2	32.3	0.18	20.3	B
14	From Carmel Center Pl to Crossroads Blvd	IV	25	11.0	4.6	15.6	0.04	9.6	D
13	From Crossroads Blvd to SR 1	IV	25	25.0	30.8	55.8	0.11	7.3	E
5	From SR 1 to Atherton Dr	IV	25	79.2	0.0	79.2	0.43	19.6	B
	Total			145.3	37.6	182.9	0.77	15.1	C

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.

Arterial Level of Service

Existing + Project AM | **Existing + Project AM-Miti**

Seg # Arterial Level of Service: NB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	IV	35	32.3	3.2	35.5	0.27	27.3	A	3.2	35.5	0.27	27.3	A
11	From Shopping Center Dwy to Carmel Valley Rd	IV	35	15.6	28.0	43.6	0.12	9.5	D	28.0	43.6	0.12	9.5	D
	Total	IV		47.9	31.2	79.1	0.38	17.5	C	31.2	79.1	0.38	17.5	C

Arterial Level of Service: SB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	IV	35	19.1	3.6	22.7	0.12	18.3	C	3.6	22.7	0.12	18.3	C
12	From Shopping Center Dwy to Rio Rd	IV	35	32.3	10.2	42.5	0.27	22.9	B	10.2	42.5	0.27	22.9	B
	Total	IV		51.4	13.8	65.2	0.39	21.3	B	13.8	65.2	0.39	21.3	B

Arterial Level of Service: EB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	IV	25	66.1	23.8	89.9	0.43	17.3	C	22.9	89.0	0.43	17.5	C
13	From SR 1 to Crossroads Blvd	IV	25	25.0	6.7	31.7	0.11	12.9	D	6.7	31.7	0.11	12.9	D
14	From Crossroads Blvd to Carmel Center Pl	IV	25	11.0	1.3	12.3	0.04	12.2	D	1.3	12.3	0.04	12.2	D
15	From Carmel Center Pl to Carmel Rancho Blvd	IV	25	30.1	7.7	37.8	0.17	16.1	C	7.7	37.8	0.17	16.1	C
	Total			132.2	39.5	171.7	0.76	15.8	C	38.6	170.8	0.76	15.9	C

Arterial Level of Service: WB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	IV	25	30.1	2.2	32.3	0.18	20.3	B	2.2	32.3	0.18	20.3	B
14	From Carmel Center Pl to Crossroads Blvd	IV	25	11.0	4.6	15.6	0.04	9.6	D	4.6	15.6	0.04	9.6	D
13	From Crossroads Blvd to SR 1	IV	25	25.0	30.8	55.8	0.11	7.3	E	29.5	54.5	0.11	7.5	E
5	From SR 1 to Atherton Dr	IV	25	66.1	0.0	66.1	0.43	23.5	B	0.0	66.1	0.43	23.5	B
	Total			132.2	37.6	169.8	0.77	16.3	C	36.3	168.5	0.77	16.4	C

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.
2. Arterial speed highlighted in yellow indicates project impact.

Arterial Level of Service

Existing PM

Seg # Arterial Level of Service: NB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	IV	35	32.3	6.6	38.9	0.27	24.9	B
11	From Shopping Center Dwy to Carmel Valley Rd	IV	35	15.6	30.9	46.5	0.12	8.9	E
	Total	IV		47.9	37.5	85.4	0.38	16.2	C

Arterial Level of Service: SB Carmel Rancho Blvd

		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	IV	35	19.1	5.7	24.8	0.12	16.8	C
12	From Shopping Center Dwy to Rio Rd	IV	35	32.3	10.7	43.0	0.27	22.6	B
	Total	IV		51.4	16.4	67.8	0.39	20.5	B

Arterial Level of Service: EB Rio Rd

		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	IV	25	66.1	23.7	89.8	0.43	17.3	C
13	From SR 1 to Crossroads Blvd	IV	25	25.0	9.9	34.9	0.11	11.7	D
14	From Crossroads Blvd to Carmel Center Pl	IV	25	11.0	2.6	13.6	0.04	11.0	D
15	From Carmel Center Pl to Carmel Rancho Blvd	IV	25	29.6	8.1	37.7	0.18	17.1	C
	Total			131.7	44.3	176.0	0.77	15.7	C

Arterial Level of Service: WB Rio Rd

		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	IV	25	29.6	3.3	32.9	0.18	19.6	B
14	From Carmel Center Pl to Crossroads Blvd	IV	25	11.0	7.0	18.0	0.04	8.3	E
13	From Crossroads Blvd to SR 1	IV	25	25.0	31.5	56.5	0.11	7.2	E
5	From SR 1 to Atherton Dr	IV	25	66.1	0.0	66.1	0.43	23.5	B
	Total			131.7	41.8	173.5	0.77	15.9	C

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.

Arterial Level of Service

Existing + Project PM | **Existing + Project PM-Miti**

Seg # Arterial Level of Service: NB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	IV	35	32.3	6.6	38.9	0.27	24.9	B	6.6	38.9	0.27	24.9	B
11	From Shopping Center Dwy to Carmel Valley Rd	IV	35	15.6	31.0	46.6	0.12	8.9	E	31.0	46.6	0.12	8.9	E
	Total	IV		47.9	37.6	85.5	0.38	16.2	C	37.6	85.5	0.38	16.2	C

Arterial Level of Service: SB Carmel Rancho Blvd

		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	IV	35	19.1	5.7	24.8	0.12	16.8	C	5.7	24.8	0.12	16.8	C
12	From Shopping Center Dwy to Rio Rd	IV	35	32.3	10.7	43.0	0.27	22.6	B	10.7	43.0	0.27	22.6	B
	Total	IV		51.4	16.4	67.8	0.39	20.5	B	16.4	67.8	0.39	20.5	B

Arterial Level of Service: EB Rio Rd

		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	IV	25	66.1	23.8	89.9	0.43	17.3	C	22.0	88.1	0.43	17.6	C
13	From SR 1 to Crossroads Blvd	IV	25	25.0	10.0	35.0	0.11	11.7	D	10.0	35.0	0.11	11.7	D
14	From Crossroads Blvd to Carmel Center Pl	IV	25	11.0	2.6	13.6	0.04	11.0	D	2.6	13.6	0.04	11.0	D
15	From Carmel Center Pl to Carmel Rancho Blvd	IV	25	29.6	8.1	37.7	0.18	17.1	C	8.1	37.7	0.18	17.1	C
	Total			131.7	44.5	176.2	0.77	15.7	C	42.7	174.4	0.77	15.8	C

Arterial Level of Service: WB Rio Rd

		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	IV	25	29.6	3.3	32.9	0.18	19.6	B	3.3	32.9	0.18	19.6	B
14	From Carmel Center Pl to Crossroads Blvd	IV	25	11.0	7.0	18.0	0.04	8.3	E	7.0	18.0	0.04	8.3	E
13	From Crossroads Blvd to SR 1	IV	25	25.0	31.6	56.6	0.11	7.2	E	28.8	53.8	0.11	7.6	E
5	From SR 1 to Atherton Dr	IV	25	66.1	0.0	66.1	0.43	23.5	B	0.0	66.1	0.43	23.5	B
	Total			131.7	41.9	173.6	0.77	15.9	C	39.1	170.8	0.77	16.1	C

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.
2. Arterial speed highlighted in yellow indicates project impact.

Arterial Level of Service

Background AM

Seg # Arterial Level of Service: NB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	IV	35	32.3	3.2	35.5	0.27	27.3	A
11	From Shopping Center Dwy to Carmel Valley Rd	IV	35	15.6	29.5	45.1	0.12	9.2	D
	Total	IV		47.9	32.7	80.6	0.38	17.2	C

Arterial Level of Service: SB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	IV	35	19.1	3.7	22.8	0.12	18.2	C
12	From Shopping Center Dwy to Rio Rd	IV	35	32.3	10.4	42.7	0.27	22.8	B
	Total	IV		51.4	14.1	65.5	0.39	21.2	B

Arterial Level of Service: EB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	IV	25	66.1	23.9	90.0	0.43	17.3	C
13	From SR 1 to Crossroads Blvd	IV	25	25.0	7.4	32.4	0.11	12.6	D
14	From Crossroads Blvd to Carmel Center Pl	IV	25	11.0	1.4	12.4	0.04	12.1	D
15	From Carmel Center Pl to Carmel Rancho Blvd	IV	25	30.1	7.8	37.9	0.17	16.0	C
	Total			132.2	40.5	172.7	0.76	15.8	C

Arterial Level of Service: WB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	IV	25	30.1	2.2	32.3	0.18	20.3	B
14	From Carmel Center Pl to Crossroads Blvd	IV	25	11.0	4.6	15.6	0.04	9.6	D
13	From Crossroads Blvd to SR 1	IV	25	25.0	30.8	55.8	0.11	7.3	E
5	From SR 1 to Atherton Dr	IV	25	66.1	0.0	66.1	0.43	23.5	B
	Total			132.2	37.6	169.8	0.77	16.3	C

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.

Arterial Level of Service

Background + Project AM | **Background + Project AM-Miti**

Seg # Arterial Level of Service: NB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	IV	35	32.3	3.2	35.5	0.27	27.3	A	3.2	35.5	0.27	27.3	A
11	From Shopping Center Dwy to Carmel Valley Rd	IV	35	15.6	29.6	45.2	0.12	9.2	D	29.6	45.2	0.12	9.2	D
	Total	IV		47.9	32.8	80.7	0.38	17.2	C	32.8	80.7	0.38	17.2	C

Arterial Level of Service: SB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	IV	35	19.1	3.8	22.9	0.12	18.2	C	3.8	22.9	0.12	18.2	C
12	From Shopping Center Dwy to Rio Rd	IV	35	32.3	10.4	42.7	0.27	22.8	B	10.4	42.7	0.27	22.8	B
	Total	IV		51.4	14.2	65.6	0.39	21.2	B	14.2	65.6	0.39	21.2	B

Arterial Level of Service: EB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	IV	25	66.1	23.9	90.0	0.43	17.3	C	23.7	89.8	0.43	17.3	C
13	From SR 1 to Crossroads Blvd	IV	25	25.0	7.4	32.4	0.11	12.6	D	7.4	32.4	0.11	12.6	D
14	From Crossroads Blvd to Carmel Center Pl	IV	25	11.0	1.4	12.4	0.04	12.1	D	1.4	12.4	0.04	12.1	D
15	From Carmel Center Pl to Carmel Rancho Blvd	IV	25	30.1	7.8	37.9	0.17	16.0	C	7.8	37.9	0.17	16.0	C
	Total			132.2	40.5	172.7	0.76	15.8	C	40.3	172.5	0.76	15.8	C

Arterial Level of Service: WB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	IV	25	30.1	2.2	32.3	0.18	20.3	B	2.2	32.3	0.18	20.3	B
14	From Carmel Center Pl to Crossroads Blvd	IV	25	11.0	4.6	15.6	0.04	9.6	D	4.6	15.6	0.04	9.6	D
13	From Crossroads Blvd to SR 1	IV	25	25.0	30.9	55.9	0.11	7.3	E	29.6	54.6	0.11	7.5	E
5	From SR 1 to Atherton Dr	IV	25	66.1	0.0	66.1	0.43	23.5	B	0.0	66.1	0.43	23.5	B
	Total			132.2	37.7	169.9	0.77	16.3	C	36.4	168.6	0.77	16.4	C

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.
2. Arterial speed highlighted in yellow indicates project impact.

Arterial Level of Service

Background PM

Seg # Arterial Level of Service: NB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	IV	35	32.3	6.7	39.0	0.27	24.8	B
11	From Shopping Center Dwy to Carmel Valley Rd	IV	35	15.6	33.0	48.6	0.12	8.6	E
	Total	IV		47.9	39.7	87.6	0.38	15.8	C

Arterial Level of Service: SB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	IV	35	19.1	5.8	24.9	0.12	16.7	C
12	From Shopping Center Dwy to Rio Rd	IV	35	32.3	10.9	43.2	0.27	22.5	B
	Total	IV		51.4	16.7	68.1	0.39	20.4	B

Arterial Level of Service: EB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	IV	25	66.1	23.9	90.0	0.43	17.3	C
13	From SR 1 to Crossroads Blvd	IV	25	25.0	10.1	35.1	0.11	11.7	D
14	From Crossroads Blvd to Carmel Center Pl	IV	25	11.0	2.7	13.7	0.04	10.9	D
15	From Carmel Center Pl to Carmel Rancho Blvd	IV	25	29.6	8.1	37.7	0.18	17.1	C
	Total			131.7	44.8	176.5	0.77	15.6	C

Arterial Level of Service: WB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	IV	25	29.6	3.3	32.9	0.18	19.6	B
14	From Carmel Center Pl to Crossroads Blvd	IV	25	11.0	6.9	17.9	0.04	8.4	E
13	From Crossroads Blvd to SR 1	IV	25	25.0	31.7	56.7	0.11	7.2	E
5	From SR 1 to Atherton Dr	IV	25	66.1	0.0	66.1	0.43	23.5	B
	Total			131.7	41.9	173.6	0.77	15.9	C

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.

Arterial Level of Service

Background + Project PM | **Background + Project PM-Miti**

Seg # Arterial Level of Service: NB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	IV	35	32.3	6.8	39.1	0.27	24.8	B	6.8	39.1	0.27	24.8	B
11	From Shopping Center Dwy to Carmel Valley Rd	IV	35	15.6	33.1	48.7	0.12	8.5	E	33.1	48.7	0.12	8.5	E
	Total	IV		47.9	39.9	87.8	0.38	15.8	C	39.9	87.8	0.38	15.8	C

Arterial Level of Service: SB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	IV	35	19.1	5.9	25.0	0.12	16.6	C	5.9	25.0	0.12	16.6	C
12	From Shopping Center Dwy to Rio Rd	IV	35	32.3	10.9	43.2	0.27	22.5	B	10.9	43.2	0.27	22.5	B
	Total	IV		51.4	16.8	68.2	0.39	20.4	B	16.8	68.2	0.39	20.4	B

Arterial Level of Service: EB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	IV	25	66.1	23.9	90.0	0.43	17.3	C	22.1	88.2	0.43	17.6	C
13	From SR 1 to Crossroads Blvd	IV	25	25.0	10.2	35.2	0.11	11.6	D	10.2	35.2	0.11	11.6	D
14	From Crossroads Blvd to Carmel Center Pl	IV	25	11.0	2.8	13.8	0.04	10.9	D	2.8	13.8	0.04	10.9	D
15	From Carmel Center Pl to Carmel Rancho Blvd	IV	25	29.6	8.1	37.7	0.18	17.1	C	8.1	37.7	0.18	17.1	C
	Total			131.7	45.0	176.7	0.77	15.6	C	43.2	174.9	0.77	15.8	C

Arterial Level of Service: WB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	IV	25	29.6	3.3	32.9	0.18	19.6	B	3.3	32.9	0.18	19.6	B
14	From Carmel Center Pl to Crossroads Blvd	IV	25	11.0	7.0	18.0	0.04	8.3	E	7.0	18.0	0.04	8.3	E
13	From Crossroads Blvd to SR 1	IV	25	25.0	31.8	56.8	0.11	7.2	E	28.9	53.9	0.11	7.6	E
5	From SR 1 to Atherton Dr	IV	25	66.1	0.0	66.1	0.43	23.5	B	0.0	66.1	0.43	23.5	B
	Total			131.7	42.1	173.8	0.77	15.9	C	39.2	170.9	0.77	16.1	C

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.
2. Arterial speed highlighted in yellow indicates project impact.

Arterial Level of Service

Cumulative AM

Seg # Arterial Level of Service: NB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	IV	35	32.3	3.3	35.6	0.27	27.2	A
11	From Shopping Center Dwy to Carmel Valley Rd	IV	35	15.6	29.9	45.5	0.12	9.1	D
	Total	IV		47.9	33.2	81.1	0.38	17.1	C

Arterial Level of Service: SB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	IV	35	19.1	3.9	23.0	0.12	18.1	C
12	From Shopping Center Dwy to Rio Rd	IV	35	32.3	10.9	43.2	0.27	22.5	B
	Total	IV		51.4	14.8	66.2	0.39	21.0	B

Arterial Level of Service: EB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	IV	25	66.1	24.7	90.8	0.43	17.1	C
13	From SR 1 to Crossroads Blvd	IV	25	25.0	12.5	37.5	0.11	10.9	D
14	From Crossroads Blvd to Carmel Center Pl	IV	25	11.0	5.9	16.9	0.04	8.9	E
15	From Carmel Center Pl to Carmel Rancho Blvd	IV	25	30.1	7.8	37.9	0.17	16.0	C
	Total			132.2	50.9	183.1	0.76	14.9	C

Arterial Level of Service: WB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	IV	25	30.1	2.3	32.4	0.18	20.2	B
14	From Carmel Center Pl to Crossroads Blvd	IV	25	11.0	11.1	22.1	0.04	6.8	F
13	From Crossroads Blvd to SR 1	IV	25	25.0	31.7	56.7	0.11	7.2	E
5	From SR 1 to Atherton Dr	IV	25	66.1	0.0	66.1	0.43	23.5	B
	Total			132.2	45.1	177.3	0.77	15.6	C

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.

Arterial Level of Service

Cumulative Plus Project AM | **Cumulative Plus Project AM-Miti**

Seg # Arterial Level of Service: NB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	IV	35	32.3	3.2	35.5	0.27	27.3	A	3.2	35.5	0.27	27.3	A
11	From Shopping Center Dwy to Carmel Valley Rd	IV	35	15.6	30.0	45.6	0.12	9.1	D	30.0	45.6	0.12	9.1	D
	Total	IV		47.9	33.2	81.1	0.38	17.1	C	33.2	81.1	0.38	17.1	C

Arterial Level of Service: SB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	IV	35	19.1	3.9	23.0	0.12	18.1	C	3.9	23.0	0.12	18.1	C
12	From Shopping Center Dwy to Rio Rd	IV	35	32.3	10.9	43.2	0.27	22.5	B	10.9	43.2	0.27	22.5	B
	Total	IV		51.4	14.8	66.2	0.39	21.0	B	14.8	66.2	0.39	21.0	B

Arterial Level of Service: EB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	IV	25	66.1	24.7	90.8	0.43	17.1	C	23.9	90.0	0.43	17.3	C
13	From SR 1 to Crossroads Blvd	IV	25	25.0	12.6	37.6	0.11	10.9	D	11.3	36.3	0.11	11.3	D
14	From Crossroads Blvd to Carmel Center Pl	IV	25	11.0	5.9	16.9	0.04	8.9	E	5.9	16.9	0.04	8.9	E
15	From Carmel Center Pl to Carmel Rancho Blvd	IV	25	30.1	7.8	37.9	0.17	16.0	C	7.8	37.9	0.17	16.0	C
	Total			132.2	51.0	183.2	0.76	14.8	C	48.9	181.1	0.76	15.0	C

Arterial Level of Service: WB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	IV	25	30.1	2.3	32.4	0.18	20.3	B	2.3	32.4	0.18	20.3	B
14	From Carmel Center Pl to Crossroads Blvd	IV	25	11.0	11.2	22.2	0.04	6.8	F	10.0	21.0	0.04	7.1	E
13	From Crossroads Blvd to SR 1	IV	25	25.0	31.7	56.7	0.11	7.2	E	30.7	55.7	0.11	7.3	E
5	From SR 1 to Atherton Dr	IV	25	66.1	0.0	66.1	0.43	23.5	B	0.0	66.1	0.43	23.5	B
	Total			132.2	45.2	177.4	0.77	15.6	C	43.0	175.2	0.77	15.8	C

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.
2. Arterial speed highlighted in yellow indicates project impact.

Arterial Level of Service

Cumulative PM

Seg # Arterial Level of Service: NB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	IV	35	32.3	7.0	39.3	0.27	24.6	B
11	From Shopping Center Dwy to Carmel Valley Rd	IV	35	15.6	34.7	50.3	0.12	8.3	E
	Total	IV		47.9	41.7	89.6	0.38	15.4	C

Arterial Level of Service: SB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	IV	35	19.1	6.2	25.3	0.12	16.4	C
12	From Shopping Center Dwy to Rio Rd	IV	35	32.3	11.7	44.0	0.27	22.1	B
	Total	IV		51.4	17.9	69.3	0.39	20.0	B

Arterial Level of Service: EB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	IV	25	66.1	25.1	91.2	0.43	17.0	C
13	From SR 1 to Crossroads Blvd	IV	25	25.0	19.5	44.5	0.11	9.2	D
14	From Crossroads Blvd to Carmel Center Pl	IV	25	11.0	8.2	19.2	0.04	7.8	E
15	From Carmel Center Pl to Carmel Rancho Blvd	IV	25	29.6	8.3	37.9	0.18	17.0	C
	Total			131.7	61.1	192.8	0.77	14.3	C

Arterial Level of Service: WB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	IV	25	29.6	3.4	33.0	0.18	19.6	B
14	From Carmel Center Pl to Crossroads Blvd	IV	25	11.0	20.3	31.3	0.04	4.8	F
13	From Crossroads Blvd to SR 1	IV	25	25.0	34.3	59.3	0.11	6.9	F
5	From SR 1 to Atherton Dr	IV	25	66.1	0.0	66.1	0.43	23.5	B
	Total			131.7	58.0	189.7	0.77	14.6	C

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.

Arterial Level of Service

Cumulative Plus Project PM | **Cumulative Plus Project PM-Miti**

Seg # Arterial Level of Service: NB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	IV	35	32.3	6.9	39.2	0.27	24.7	B	6.9	39.2	0.27	24.7	B
11	From Shopping Center Dwy to Carmel Valley Rd	IV	35	15.6	34.9	50.5	0.12	8.2	E	34.9	50.5	0.12	8.2	E
	Total	IV		47.9	41.8	89.7	0.38	15.4	C	41.8	89.7	0.38	15.4	C

Arterial Level of Service: SB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	IV	35	19.1	6.1	25.2	0.12	16.5	C	6.1	25.2	0.12	16.5	C
12	From Shopping Center Dwy to Rio Rd	IV	35	32.3	11.7	44.0	0.27	22.1	B	11.7	44.0	0.27	22.1	B
	Total	IV		51.4	17.8	69.2	0.39	20.1	B	17.8	69.2	0.39	20.1	B

Arterial Level of Service: EB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	IV	25	66.1	25.2	91.3	0.43	17.0	C	24.1	90.2	0.43	17.2	C
13	From SR 1 to Crossroads Blvd	IV	25	25.0	19.8	44.8	0.11	9.1	D	18.9	43.9	0.11	9.3	D
14	From Crossroads Blvd to Carmel Center Pl	IV	25	11.0	8.3	19.3	0.04	7.8	E	8.3	19.3	0.04	7.8	E
15	From Carmel Center Pl to Carmel Rancho Blvd	IV	25	29.6	8.3	37.9	0.18	17.0	C	8.3	37.9	0.18	17.0	C
	Total			131.7	61.6	193.3	0.77	14.3	C	59.6	191.3	0.77	14.4	C

Arterial Level of Service: WB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	IV	25	29.6	3.4	33.0	0.18	19.6	B	3.4	33.0	0.18	19.6	B
14	From Carmel Center Pl to Crossroads Blvd	IV	25	11.0	20.4	31.4	0.04	4.8	F	19.5	30.5	0.04	4.9	F
13	From Crossroads Blvd to SR 1	IV	25	25.0	34.5	59.5	0.11	6.9	F	32.5	57.5	0.11	7.1	E
5	From SR 1 to Atherton Dr	IV	25	66.1	0.0	66.1	0.43	23.5	B	0.0	66.1	0.43	23.5	B
	Total			131.7	58.3	190.0	0.77	14.5	C	55.4	187.1	0.77	14.8	C

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.
2. Arterial speed highlighted in yellow indicates project impact.

Appendix G

Approved Projects Trip Generation

TRIP GENERATION FOR APPROVED PROJECTS

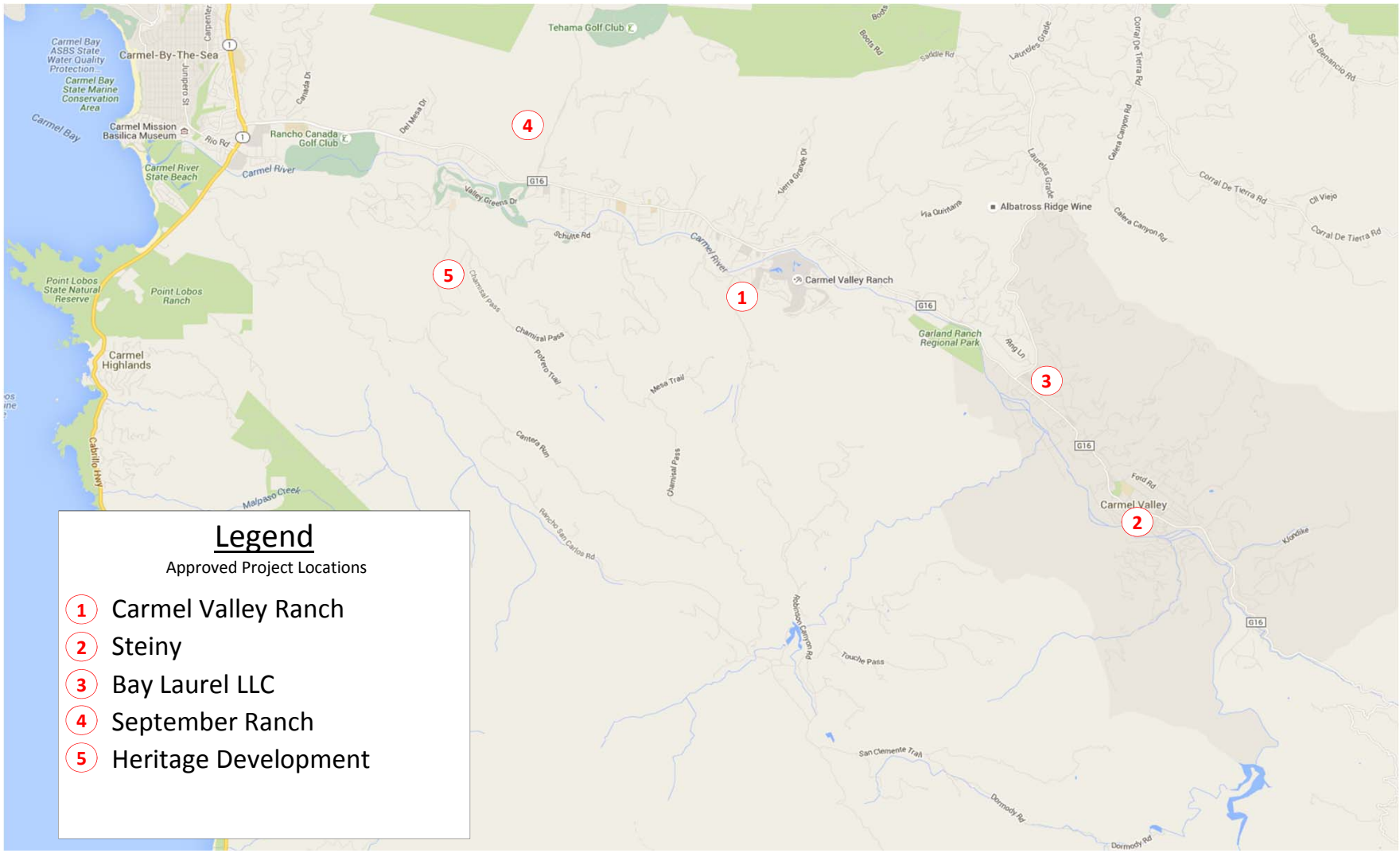
PROJECT	SIZE	DAILY TRIP RATE	DAILY TRIPS	AM PEAK HOUR PEAK HOUR VOL.	AM PEAK HOUR (% OF DAILY)	AM PEAK HOUR IN	AM PEAK HOUR OUT	PM PEAK HOUR PEAK HOUR VOL.	PM PEAK HOUR (% OF DAILY)	PM PEAK HOUR IN	PM PEAK HOUR OUT
1. Carmel Valley Ranch	47 units	8.92	419	17	(4%)	12	5	23	(5%)	10	13
2. Steiny	-										
Comercial Retail	15,500 S.F.	0.04	687	42	(6%)	18	24	78	(11%)	44	34
Apartments	16 units	6.65	106	8	(8%)	2	6	10	(9%)	2	8
3. Bay Laurel LLC[2]	16 rooms	8.92	143	11	(8%)	6	5	11	(8%)	5	6
4. September Ranch	-										
Residential lots	95 units	9.52	904	71	(8%)	18	53	95	(11%)	60	35
Equestrian center[3]	50 stables	2.21	111	7	(6%)	5	2	14	(13%)	7	7
5. Heritage Development	3 units	9.52	29	2	(7%)	0	2	3	(11%)	2	1
TOTAL APPROVED PROJECTS			2,399	158	(7%)	61	97	234	(10%)	130	104

Notes:

1. Traffic volumes are based on trip generation rates quoted by the Institute of Transportation Engineers, Trip Generation Manual, 9th Edition, 2012, unless otherwise noted.
2. *Bernardus Lodge Expansion Traffic Impact Analysis*, Higgins Associates, September 15, 2008.
3. *Monterey Downs and Monterey Horse Park and Central Coast Veterans Cemetary Specific Plan*, RBF Consulting, March 2015.

Appendix H

Approved Projects Location Map



Map Source: Google Maps, 2015

Appendix I

Cumulative Projects Trip Generation

TRIP GENERATION FOR CUMULATIVE PROJECTS

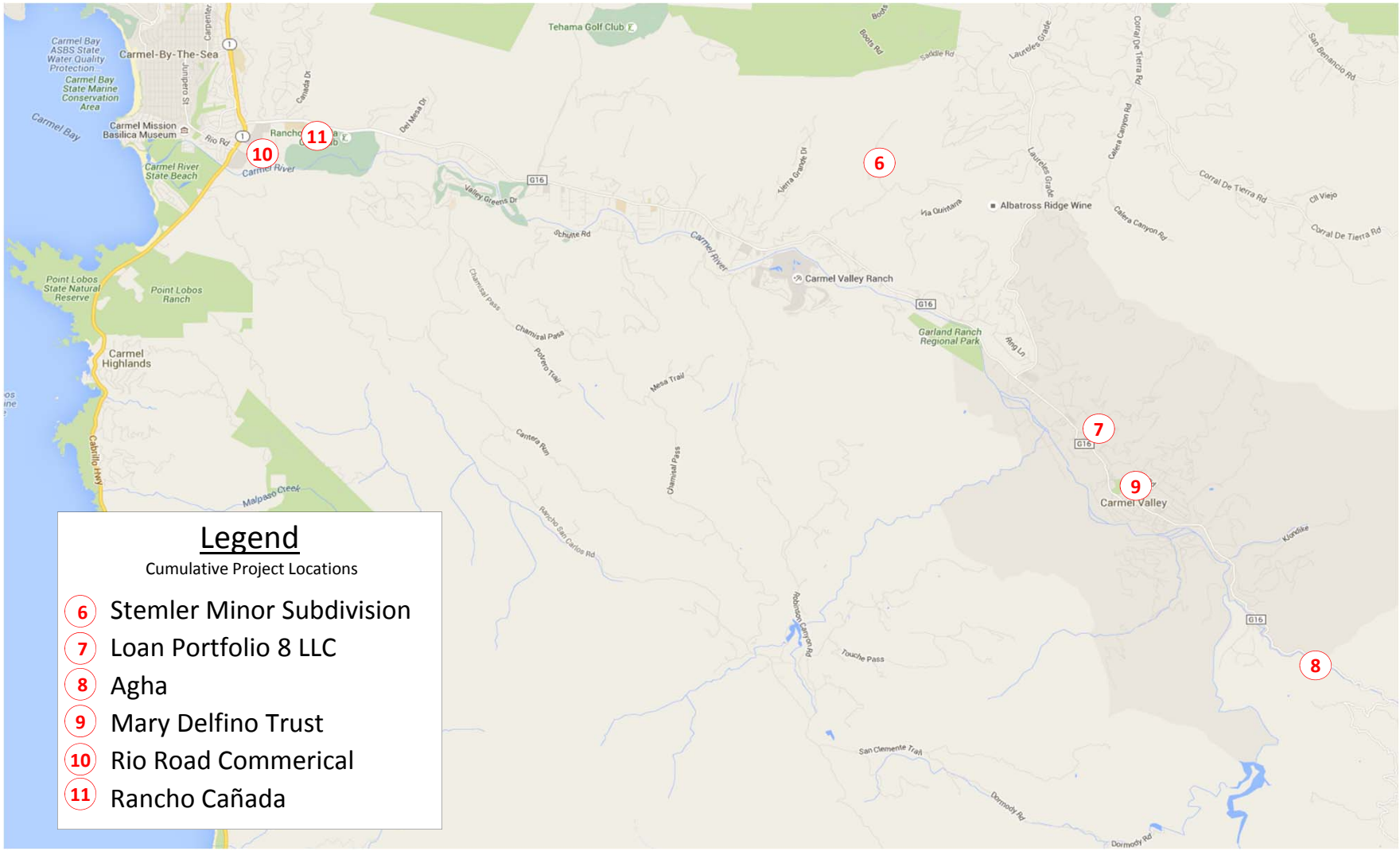
0.10224		DAILY TRIP	DAILY	AM PEAK HOUR PEAK HOUR	(% OF			PM PEAK HOUR PEAK HOUR	(% OF		
PROJECT	SIZE	RATE	TRIPS	VOL.	DAILY)	IN	OUT	VOL.	DAILY)	IN	OUT
6. Stemler Minor Subdivision	2 units	9.52	19	2	(11%)	0	2	2	(11%)	2	0
7. Loan Portfolio 8 LLC	-										
Demolition of exisiting hotel/spa	-22 units	8.92	-196	-8	(4%)	-6	-2	-11	(6%)	-5	-6
Development of resort hotel	60 units	8.92	535	22	(4%)	16	6	29	(5%)	12	17
8. Agha	20 lots	9.52	190	15	(8%)	4	11	20	(11%)	13	7
9. Mary Delfino Trust	-										
Single Family Lots	18 units	9.52	171	14	(8%)	4	10	18	(11%)	11	7
Multi-Family Lots	6 units	6.65	40	3	(8%)	1	2	4	(10%)	1	3
10. Rio Road Commercial											
Grocery Store	30,000 S.F.	0.10	3,067	102	(3%)	63	39	284	(9%)	145	139
Retail	14,500 S.F.	0.04	643	39	(6%)	17	22	73	(11%)	41	32
11. Rancho Cañada	130 lots	9.52	1,238	98	(8%)	25	73	130	(11%)	82	48
TOTAL CUMULATIVE PROJECTS			5,707	287	5%	124	163	549	10%	302	247

Notes:

1. Traffic volumes are based on trip generation rates quoted by the Institute of Transportation Engineers, Trip Generation Manual, 9th Edition, 2012, unless otherwise noted.

Appendix J

Cumulative Projects Location Map



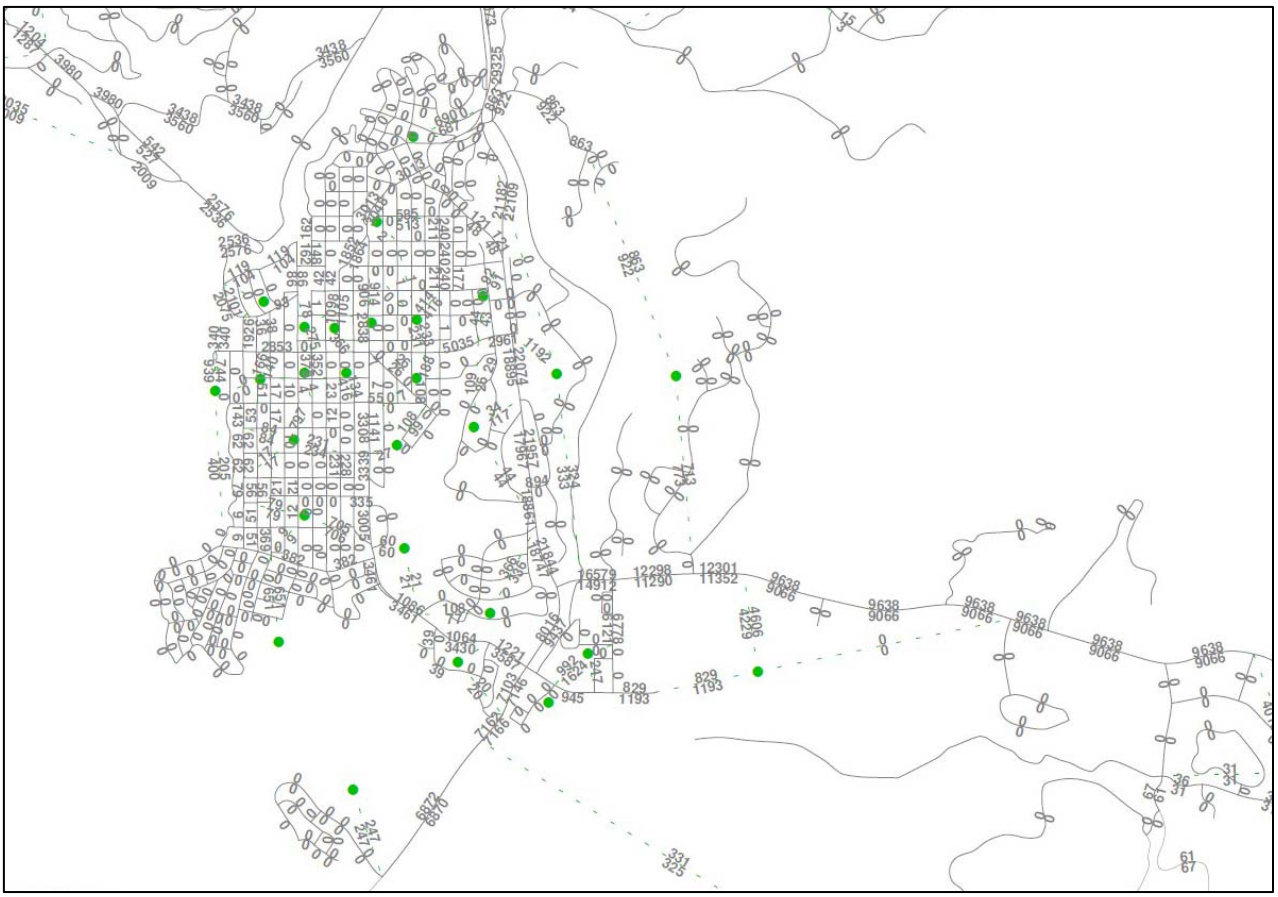
Map Source: Google Maps, 2015

Appendix K

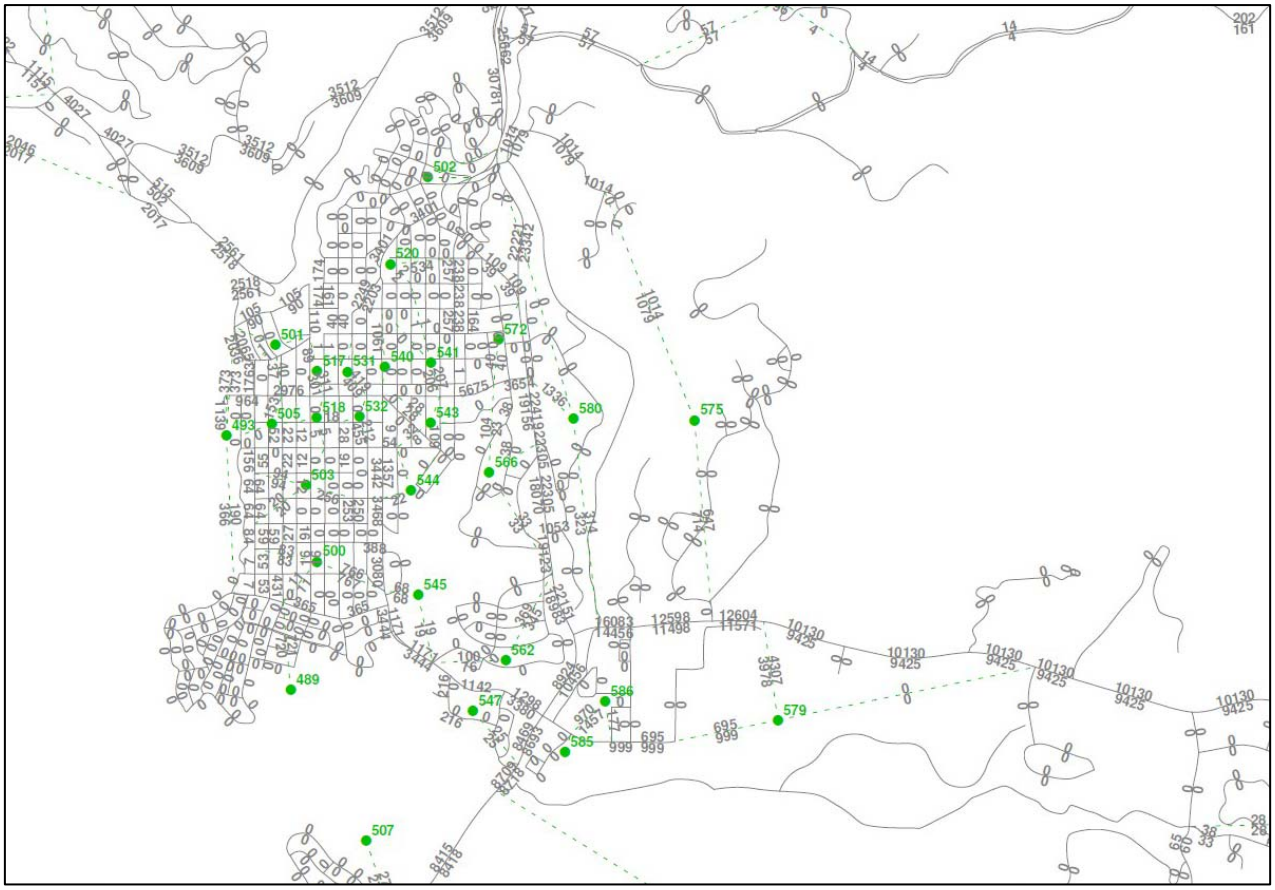
AMBAG Model Plots

Appendix K

AMBAG 2014 Daily Traffic Volumes Model Plot



AMBAG 2035 Daily Traffic Volumes Model Plot



Appendix L

Project Alternative Scenarios Intersection LOS Calculations

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	0	733	458	54	1059	694
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9	4.9	4.9	4.0
Lane Util. Factor		0.88	1.00	1.00	0.97	1.00
Frt		0.85	1.00	0.85	1.00	1.00
Flt Protected		1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		2760	1863	1509	3335	1759
Flt Permitted		1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		2760	1863	1509	3335	1759
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	797	498	59	1151	754
RTOR Reduction (vph)	0	259	0	12	0	0
Lane Group Flow (vph)	0	538	498	47	1151	754
Heavy Vehicles (%)	0%	3%	2%	7%	5%	8%
Turn Type		Over	NA	Perm	Prot	NA
Protected Phases		3	2		3	Free
Permitted Phases				2		
Actuated Green, G (s)		25.1	20.6	20.6	25.1	55.5
Effective Green, g (s)		25.1	20.6	20.6	25.1	55.5
Actuated g/C Ratio		0.45	0.37	0.37	0.45	1.00
Clearance Time (s)		4.9	4.9	4.9	4.9	
Vehicle Extension (s)		4.5	3.5	3.5	4.5	
Lane Grp Cap (vph)		1248	691	560	1508	1759
v/s Ratio Prot		0.19	c0.27		c0.35	0.43
v/s Ratio Perm				0.03		
v/c Ratio		0.43	0.72	0.08	0.76	0.43
Uniform Delay, d1		10.3	15.0	11.3	12.7	0.0
Progression Factor		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.4	3.8	0.1	2.6	0.8
Delay (s)		10.8	18.8	11.4	15.4	0.8
Level of Service		B	B	B	B	A
Approach Delay (s)	10.8		18.0			9.6
Approach LOS	B		B			A

Intersection Summary			
HCM 2000 Control Delay	11.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	55.5	Sum of lost time (s)	9.8
Intersection Capacity Utilization	62.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	27	685	401	395	612	5	86	5	258	10	17	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		0.95	0.95	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00	1.00		1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.98	1.00
Satd. Flow (prot)	1736	3374	1563	3467	3501		1618	1641	1524		1681	1560
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.98	1.00
Satd. Flow (perm)	1736	3374	1563	3467	3501		1618	1641	1524		1681	1560
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	31	778	456	449	695	6	98	6	293	11	19	38
RTOR Reduction (vph)	0	0	291	0	1	0	0	0	244	0	0	37
Lane Group Flow (vph)	31	778	165	449	700	0	52	52	49	0	30	1
Confl. Peds. (#/hr)	2		1			1	1			1		2
Heavy Vehicles (%)	4%	7%	2%	1%	3%	0%	6%	0%	6%	30%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Over	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	7	7	
Permitted Phases			2									7
Actuated Green, G (s)	1.8	20.2	20.2	9.3	27.8		4.3	4.3	9.3		1.5	1.5
Effective Green, g (s)	1.8	20.2	20.2	9.3	27.8		4.3	4.3	9.3		1.5	1.5
Actuated g/C Ratio	0.03	0.36	0.36	0.17	0.50		0.08	0.08	0.17		0.03	0.03
Clearance Time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Vehicle Extension (s)	1.0	1.3	1.3	1.0	1.3		1.0	1.0	1.0		1.0	1.0
Lane Grp Cap (vph)	56	1223	566	578	1747		124	126	254		45	42
v/s Ratio Prot	0.02	c0.23		c0.13	0.20		c0.03	0.03	0.03		c0.02	
v/s Ratio Perm			0.11									0.00
v/c Ratio	0.55	0.64	0.29	0.78	0.40		0.42	0.41	0.19		0.67	0.02
Uniform Delay, d1	26.6	14.7	12.7	22.2	8.7		24.5	24.5	20.0		26.9	26.4
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	6.6	0.8	0.1	5.9	0.1		0.8	0.8	0.1		25.2	0.1
Delay (s)	33.1	15.5	12.8	28.1	8.8		25.3	25.3	20.1		52.1	26.5
Level of Service	C	B	B	C	A		C	C	C		D	C
Approach Delay (s)		14.9			16.3			21.5			37.8	
Approach LOS		B			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	16.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	55.7	Sum of lost time (s)	20.4
Intersection Capacity Utilization	52.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	133	221	36	124	177	151	23	228	81	298	355	41
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1842	1900	1863	1810	1827	1759	1827	1863	1827	1820	1900
Adj Flow Rate, veh/h	145	240	39	135	192	164	25	248	88	324	386	45
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	2	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	3	3	2	5	4	8	4	2	4	4	4
Cap, veh/h	215	640	103	212	379	322	76	447	385	504	557	65
Arrive On Green	0.12	0.21	0.21	0.12	0.21	0.21	0.05	0.24	0.24	0.15	0.35	0.35
Sat Flow, veh/h	1774	3021	484	1774	1810	1534	1675	1827	1574	3375	1599	186
Grp Volume(v), veh/h	145	138	141	135	192	164	25	248	88	324	0	431
Grp Sat Flow(s),veh/h/ln	1774	1750	1755	1774	1810	1534	1675	1827	1574	1688	0	1785
Q Serve(g_s), s	4.7	4.0	4.1	4.4	5.6	5.7	0.9	7.1	2.7	5.4	0.0	12.4
Cycle Q Clear(g_c), s	4.7	4.0	4.1	4.4	5.6	5.7	0.9	7.1	2.7	5.4	0.0	12.4
Prop In Lane	1.00		0.28	1.00		1.00	1.00		1.00	1.00		0.10
Lane Grp Cap(c), veh/h	215	371	372	212	379	322	76	447	385	504	0	622
V/C Ratio(X)	0.67	0.37	0.38	0.64	0.51	0.51	0.33	0.55	0.23	0.64	0.00	0.69
Avail Cap(c_a), veh/h	275	814	816	275	841	713	223	791	682	579	0	842
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	25.2	20.2	20.3	25.2	21.0	21.0	27.8	19.8	18.1	24.0	0.0	16.8
Incr Delay (d2), s/veh	4.3	0.7	0.8	3.2	1.3	1.5	2.5	1.3	0.4	2.0	0.0	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	2.0	2.1	2.3	3.0	2.5	0.5	3.7	1.2	2.7	0.0	6.4
LnGrp Delay(d),s/veh	29.6	21.0	21.0	28.4	22.2	22.5	30.2	21.1	18.5	26.0	0.0	18.6
LnGrp LOS	C	C	C	C	C	C	C	C	B	C		B
Approach Vol, veh/h		424			491			361			755	
Approach Delay, s/veh		23.9			24.0			21.1			21.8	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.9	16.9	6.4	25.8	11.0	16.8	12.7	19.6
Change Period (Y+Rc), s	3.7	* 4.2	3.7	4.9	3.7	* 4.2	3.7	4.9
Max Green Setting (Gmax), s	9.3	* 28	8.0	28.3	9.3	* 28	10.3	26.0
Max Q Clear Time (g_c+I1), s	6.4	6.1	2.9	14.4	6.7	7.7	7.4	9.1
Green Ext Time (p_c), s	0.1	4.3	0.0	4.2	0.1	4.2	0.3	4.6

Intersection Summary		
HCM 2010 Ctrl Delay		22.6
HCM 2010 LOS		C

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	53	388	83	86	263	0	140	0	69	0	0	0
Number	5	2	12	1	6	16	3	8	18			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1900	1860	1900	1810	1792	0	1810	1696	1900			
Adj Flow Rate, veh/h	58	426	91	95	289	0	154	0	76			
Adj No. of Lanes	1	2	0	1	2	0	2	1	0			
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91			
Percent Heavy Veh, %	0	2	2	5	6	0	5	0	5			
Cap, veh/h	80	1759	373	118	2148	0	317	0	137			
Arrive On Green	0.04	0.61	0.61	0.14	1.00	0.00	0.09	0.00	0.09			
Sat Flow, veh/h	1810	2901	615	1723	3495	0	3343	0	1442			
Grp Volume(v), veh/h	58	258	259	95	289	0	154	0	76			
Grp Sat Flow(s),veh/h/ln	1810	1767	1749	1723	1703	0	1672	0	1442			
Q Serve(g_s), s	1.6	3.4	3.4	2.7	0.0	0.0	2.2	0.0	2.5			
Cycle Q Clear(g_c), s	1.6	3.4	3.4	2.7	0.0	0.0	2.2	0.0	2.5			
Prop In Lane	1.00		0.35	1.00		0.00	1.00		1.00			
Lane Grp Cap(c), veh/h	80	1071	1061	118	2148	0	317	0	137			
V/C Ratio(X)	0.72	0.24	0.24	0.80	0.13	0.00	0.49	0.00	0.56			
Avail Cap(c_a), veh/h	199	1071	1061	224	2148	0	1070	0	461			
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.88	0.88	0.88	1.00	1.00	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	23.6	4.5	4.5	21.2	0.0	0.0	21.5	0.0	21.6			
Incr Delay (d2), s/veh	4.0	0.5	0.5	4.7	0.1	0.0	0.4	0.0	1.3			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.9	1.7	1.7	1.4	0.0	0.0	1.0	0.0	1.0			
LnGrp Delay(d),s/veh	27.6	5.0	5.0	26.0	0.1	0.0	21.9	0.0	22.9			
LnGrp LOS	C	A	A	C	A		C		C			
Approach Vol, veh/h		575			384			230				
Approach Delay, s/veh		7.3			6.5			22.2				
Approach LOS		A			A			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	6.9	34.3			5.7	35.5		8.7
Change Period (Y+Rc), s	3.5	4.0			3.5	4.0		4.0
Max Green Setting (Gmax), s	6.5	16.0			5.5	17.0		16.0
Max Q Clear Time (g_c+I1), s	4.7	5.4			3.6	2.0		4.5
Green Ext Time (p_c), s	0.0	2.8			0.0	3.3		0.4

Intersection Summary		
HCM 2010 Ctrl Delay		9.9
HCM 2010 LOS		A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	365	92	61	317	1	32	0	38	0	0	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	0.99		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1820	1900	1845	1845	1900	1900	1638	1712	1900	1900	1900
Adj Flow Rate, veh/h	0	440	111	73	382	1	39	0	46	0	0	0
Adj No. of Lanes	0	2	0	1	2	0	0	1	1	0	1	0
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	0	4	4	3	3	3	0	0	11	0	0	0
Cap, veh/h	0	1817	455	91	2814	7	212	0	80	0	105	0
Arrive On Green	0.00	0.22	0.22	0.05	0.78	0.78	0.06	0.00	0.06	0.00	0.00	0.00
Sat Flow, veh/h	0	2832	686	1757	3586	9	1228	0	1444	0	1900	0
Grp Volume(v), veh/h	0	276	275	73	187	196	39	0	46	0	0	0
Grp Sat Flow(s),veh/h/ln	0	1729	1698	1757	1753	1843	1228	0	1444	0	1900	0
Q Serve(g_s), s	0.0	6.6	6.7	2.1	1.3	1.3	1.5	0.0	1.6	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	6.6	6.7	2.1	1.3	1.3	1.5	0.0	1.6	0.0	0.0	0.0
Prop In Lane	0.00		0.40	1.00		0.01	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	0	1146	1125	91	1375	1446	212	0	80	0	105	0
V/C Ratio(X)	0.00	0.24	0.24	0.80	0.14	0.14	0.18	0.00	0.57	0.00	0.00	0.00
Avail Cap(c_a), veh/h	0	1146	1125	193	1375	1446	537	0	462	0	608	0
HCM Platoon Ratio	1.00	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.98	0.98	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	9.2	9.2	23.5	1.3	1.3	23.0	0.0	23.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.5	0.5	6.1	0.2	0.2	0.2	0.0	2.4	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.3	3.3	1.1	0.6	0.7	0.5	0.0	0.7	0.0	0.0	0.0
LnGrp Delay(d),s/veh	0.0	9.6	9.7	29.5	1.5	1.5	23.2	0.0	25.4	0.0	0.0	0.0
LnGrp LOS		A	A	C	A	A	C		C			
Approach Vol, veh/h		551			456			85			0	
Approach Delay, s/veh		9.7			6.0			24.4			0.0	
Approach LOS		A			A			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	6.1	37.1		6.8		43.2		6.8
Change Period (Y+Rc), s	3.5	4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s	5.5	17.0		16.0		26.0		16.0
Max Q Clear Time (g_c+I1), s	4.1	8.7		0.0		3.3		3.6
Green Ext Time (p_c), s	0.0	3.9		0.0		6.8		0.1

Intersection Summary		
HCM 2010 Ctrl Delay		9.3
HCM 2010 LOS		A

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	218	0	16	0	1	0	17	15	0	0	32	307
Conflicting Peds, #/hr	2	0	2	0	0	0	2	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	210	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	1	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	92	80	92	92	92	80	80	92	92	80	80
Heavy Vehicles, %	7	0	0	2	2	2	0	7	0	0	0	2
Mvmt Flow	272	0	20	0	1	0	21	19	0	0	40	384

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	3	0	0	2	0	0	25	550	2	14	550	5
Stage 1	-	-	-	-	-	-	2	547	-	3	3	-
Stage 2	-	-	-	-	-	-	23	3	-	11	547	-
Critical Hdwy	4.17	-	-	-	-	-	7.1	6.57	-	7.1	6.5	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.57	-	-	-	-
Follow-up Hdwy	2.263	-	-	-	-	-	3.5	4.063	-	3.5	4	3.318
Pot Cap-1 Maneuver	1587	-	-	-	-	-	991	436	-	1007	446	1078
Stage 1	-	-	-	-	-	-	-	-	-	1025	897	-
Stage 2	-	-	-	-	-	-	1000	883	-	-	-	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1584	-	-	-	-	-	571	360	-	-	368	1074
Mov Cap-2 Maneuver	-	-	-	-	-	-	371	1061	-	-	~ -783	-
Stage 1	-	-	-	-	-	-	-	-	-	847	896	-
Stage 2	-	-	-	-	-	-	613	882	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	7.2	0		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	371	-	1584	-	-	-	-	-	-	1074
HCM Lane V/C Ratio	0.057	-	0.172	-	-	-	-	-	-	0.357
HCM Control Delay (s)	15.3	-	7.7	-	-	0	-	-	-	10.2
HCM Lane LOS	C	-	A	-	-	A	-	-	-	B
HCM 95th %tile Q(veh)	0.2	-	0.6	-	-	-	-	-	-	1.6

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	213	40	113	134	38	50	136	992	37	16	1427	137
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.94	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1869	1900	1900	1842	1900	1827	1839	1900	1357	1827	1845
Adj Flow Rate, veh/h	210	94	130	128	81	57	156	1140	43	18	1640	0
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	3	0	0	0	9	9	4	3	3	40	4	3
Cap, veh/h	288	114	158	151	82	58	163	1827	69	37	1620	732
Arrive On Green	0.16	0.16	0.16	0.08	0.08	0.08	0.09	0.53	0.53	0.03	0.47	0.00
Sat Flow, veh/h	1757	697	965	1810	977	688	1740	3432	129	1293	3471	1568
Grp Volume(v), veh/h	210	0	224	128	0	138	156	580	603	18	1640	0
Grp Sat Flow(s),veh/h/ln	1757	0	1662	1810	0	1665	1740	1747	1814	1293	1736	1568
Q Serve(g_s), s	10.0	0.0	11.5	6.2	0.0	7.3	7.9	20.6	20.6	1.2	41.3	0.0
Cycle Q Clear(g_c), s	10.0	0.0	11.5	6.2	0.0	7.3	7.9	20.6	20.6	1.2	41.3	0.0
Prop In Lane	1.00		0.58	1.00		0.41	1.00		0.07	1.00		1.00
Lane Grp Cap(c), veh/h	288	0	272	151	0	139	163	930	965	37	1620	732
V/C Ratio(X)	0.73	0.00	0.82	0.85	0.00	0.99	0.96	0.62	0.62	0.49	1.01	0.00
Avail Cap(c_a), veh/h	318	0	300	151	0	139	163	930	965	107	1620	732
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	35.1	0.0	35.8	40.0	0.0	40.5	39.9	14.5	14.5	42.4	23.6	0.0
Incr Delay (d2), s/veh	7.9	0.0	16.0	34.4	0.0	73.5	57.3	1.7	1.6	9.9	25.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.5	0.0	6.5	4.5	0.0	6.2	6.4	10.3	10.6	0.5	25.3	0.0
LnGrp Delay(d),s/veh	43.1	0.0	51.7	74.3	0.0	114.0	97.2	16.2	16.1	52.3	49.0	0.0
LnGrp LOS	D		D	E		F	F	B	B	D	F	
Approach Vol, veh/h		434			266			1339			1658	
Approach Delay, s/veh		47.5			94.9			25.6			49.1	
Approach LOS		D			F			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		18.7	12.0	46.2		11.6	6.2	52.0
Change Period (Y+Rc), s		* 4.2	3.7	4.9		4.2	3.7	4.9
Max Green Setting (Gmax), s		* 16	8.3	41.3		7.4	7.3	42.3
Max Q Clear Time (g_c+I1), s		13.5	9.9	43.3		9.3	3.2	22.6
Green Ext Time (p_c), s		0.6	0.0	0.0		0.0	0.0	18.9

Intersection Summary	
HCM 2010 Ctrl Delay	43.7
HCM 2010 LOS	D

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	402	5	17	18	14	49	19	1230	10	32	1568	702
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.88		1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.99	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1681		1665	1782	1572	1736	3531		1770	3438	1538
Flt Permitted	0.95	1.00		0.95	0.99	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1681		1665	1782	1572	1736	3531		1770	3438	1538
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	467	6	20	21	16	57	22	1430	12	37	1823	816
RTOR Reduction (vph)	0	17	0	0	0	54	0	0	0	0	0	0
Lane Group Flow (vph)	467	9	0	18	19	3	22	1442	0	37	1823	816
Confl. Peds. (#/hr)				1		1			1	1		
Heavy Vehicles (%)	2%	0%	0%	3%	0%	1%	4%	2%	13%	2%	5%	5%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA		Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6						Free
Actuated Green, G (s)	18.9	18.9		6.8	6.8	6.8	4.5	69.6		4.5	70.1	117.7
Effective Green, g (s)	18.9	18.9		6.8	6.8	6.8	4.5	69.6		4.5	70.1	117.7
Actuated g/C Ratio	0.16	0.16		0.06	0.06	0.06	0.04	0.59		0.04	0.60	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)	551	269		96	102	90	66	2088		67	2047	1538
v/s Ratio Prot	c0.14	0.01		0.01	0.01		0.01	0.41		0.02	c0.53	
v/s Ratio Perm						0.00						c0.53
v/c Ratio	0.85	0.03		0.19	0.19	0.04	0.33	0.69		0.55	0.89	0.53
Uniform Delay, d1	48.0	41.7		52.8	52.8	52.4	55.1	16.6		55.6	20.5	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	12.4	0.1		1.6	1.5	0.3	3.0	1.3		9.5	5.7	1.3
Delay (s)	60.4	41.8		54.5	54.3	52.6	58.1	17.9		65.1	26.2	1.3
Level of Service	E	D		D	D	D	E	B		E	C	A
Approach Delay (s)		59.4			53.3			18.5			19.1	
Approach LOS		E			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	23.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	117.7	Sum of lost time (s)	17.9
Intersection Capacity Utilization	69.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	51	1	19	9	1	20	17	201	15	76	499	163
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		1.00	1.00		0.99	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1882	1900	1900	1785	1863	1881	1848	1900	1827	1854	1900
Adj Flow Rate, veh/h	66	1	25	12	1	26	22	261	19	99	648	212
Adj No. of Lanes	1	1	0	0	1	1	1	2	0	1	2	0
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Percent Heavy Veh, %	0	0	0	0	0	2	1	3	3	4	3	3
Cap, veh/h	485	7	177	463	15	180	563	1638	119	835	1286	420
Arrive On Green	0.11	0.11	0.11	0.11	0.11	0.11	0.49	0.49	0.49	0.49	0.49	0.49
Sat Flow, veh/h	1392	62	1545	1084	134	1574	645	3320	240	1071	2607	852
Grp Volume(v), veh/h	66	0	26	13	0	26	22	137	143	99	438	422
Grp Sat Flow(s),veh/h/ln	1392	0	1607	1218	0	1574	645	1756	1805	1071	1761	1698
Q Serve(g_s), s	0.9	0.0	0.3	0.1	0.0	0.3	0.5	0.9	0.9	1.1	3.4	3.4
Cycle Q Clear(g_c), s	1.3	0.0	0.3	0.4	0.0	0.3	3.9	0.9	0.9	2.0	3.4	3.4
Prop In Lane	1.00		0.96	0.92		1.00	1.00		0.13	1.00		0.50
Lane Grp Cap(c), veh/h	485	0	184	479	0	180	563	866	891	835	869	838
V/C Ratio(X)	0.14	0.00	0.14	0.03	0.00	0.14	0.04	0.16	0.16	0.12	0.50	0.50
Avail Cap(c_a), veh/h	1690	0	1574	1643	0	1542	782	1463	1503	1198	1467	1414
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	8.8	0.0	8.1	8.2	0.0	8.1	4.8	2.8	2.8	3.4	3.5	3.5
Incr Delay (d2), s/veh	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.1	0.1	0.0	0.1	0.1	0.4	0.4	0.3	1.6	1.6
LnGrp Delay(d),s/veh	8.8	0.0	8.3	8.2	0.0	8.3	4.8	2.9	2.9	3.4	3.7	3.7
LnGrp LOS	A		A	A		A	A	A	A	A	A	A
Approach Vol, veh/h		92			39			302			959	
Approach Delay, s/veh		8.7			8.2			3.0			3.6	
Approach LOS		A			A			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		6.3		14.1		6.3		14.1
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		20.0		17.0		20.0		17.0
Max Q Clear Time (g_c+I1), s		3.3		5.4		2.4		5.9
Green Ext Time (p_c), s		0.2		4.1		0.2		4.0

Intersection Summary	
HCM 2010 Ctrl Delay	4.0
HCM 2010 LOS	A

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	0	853	778	88	847	618
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9	4.9	4.9	4.0
Lane Util. Factor		0.88	1.00	1.00	0.97	1.00
Frt		0.85	1.00	0.85	1.00	1.00
Flt Protected		1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		2814	1863	1553	3467	1881
Flt Permitted		1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		2814	1863	1553	3467	1881
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	907	828	94	901	657
RTOR Reduction (vph)	0	170	0	10	0	0
Lane Group Flow (vph)	0	737	828	84	901	657
Heavy Vehicles (%)	0%	1%	2%	4%	1%	1%
Turn Type		Over	NA	Perm	Prot	NA
Protected Phases		3	2		3	Free
Permitted Phases				2		
Actuated Green, G (s)		20.3	31.1	31.1	20.3	61.2
Effective Green, g (s)		20.3	31.1	31.1	20.3	61.2
Actuated g/C Ratio		0.33	0.51	0.51	0.33	1.00
Clearance Time (s)		4.9	4.9	4.9	4.9	
Vehicle Extension (s)		4.5	3.5	3.5	4.5	
Lane Grp Cap (vph)		933	946	789	1150	1881
v/s Ratio Prot		c0.26	c0.44		0.26	0.35
v/s Ratio Perm				0.05		
v/c Ratio		0.79	0.88	0.11	0.78	0.35
Uniform Delay, d1		18.5	13.3	7.8	18.5	0.0
Progression Factor		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		5.0	9.3	0.1	4.0	0.5
Delay (s)		23.5	22.6	7.9	22.4	0.5
Level of Service		C	C	A	C	A
Approach Delay (s)	23.5		21.1			13.2
Approach LOS	C		C			B

Intersection Summary			
HCM 2000 Control Delay	18.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	61.2	Sum of lost time (s)	9.8
Intersection Capacity Utilization	79.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	711	193	301	558	4	277	17	510	4	23	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		0.95	0.95	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	1.00
Satd. Flow (prot)	1805	3539	1615	3467	3571		1715	1728	1599		1887	1553
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	1.00
Satd. Flow (perm)	1805	3539	1615	3467	3571		1715	1728	1599		1887	1553
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	33	756	205	320	594	4	295	18	543	4	24	19
RTOR Reduction (vph)	0	0	139	0	1	0	0	0	460	0	0	19
Lane Group Flow (vph)	33	756	66	320	597	0	156	157	83	0	28	0
Heavy Vehicles (%)	0%	2%	0%	1%	1%	0%	0%	0%	1%	0%	0%	4%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Over	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	7	7	
Permitted Phases			2									7
Actuated Green, G (s)	1.8	19.1	19.1	9.0	26.4		8.9	8.9	9.0		1.5	1.5
Effective Green, g (s)	1.8	19.1	19.1	9.0	26.4		8.9	8.9	9.0		1.5	1.5
Actuated g/C Ratio	0.03	0.32	0.32	0.15	0.45		0.15	0.15	0.15		0.03	0.03
Clearance Time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Vehicle Extension (s)	1.0	1.3	1.3	1.0	1.3		1.0	1.0	1.0		1.0	1.0
Lane Grp Cap (vph)	55	1147	523	529	1600		259	261	244		48	39
v/s Ratio Prot	0.02	c0.21		c0.09	0.17		c0.09	0.09	0.05		c0.01	
v/s Ratio Perm			0.04									0.00
v/c Ratio	0.60	0.66	0.13	0.60	0.37		0.60	0.60	0.34		0.58	0.01
Uniform Delay, d1	28.2	17.1	14.0	23.3	10.8		23.3	23.3	22.3		28.4	28.0
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	11.2	1.1	0.0	1.3	0.1		2.7	2.7	0.3		11.1	0.0
Delay (s)	39.4	18.2	14.1	24.6	10.8		26.0	26.0	22.6		39.5	28.0
Level of Service	D	B	B	C	B		C	C	C		D	C
Approach Delay (s)		18.0			15.6			23.9			34.9	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	19.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	58.9	Sum of lost time (s)	20.4
Intersection Capacity Utilization	66.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	143	348	83	166	401	296	162	427	155	265	309	44
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1878	1900	1881	1881	1863	1881	1845	1863	1881	1884	1900
Adj Flow Rate, veh/h	146	355	85	169	409	302	165	436	158	270	315	45
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	2	1	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	1	1	1	1	2	1	3	2	1	1	1
Cap, veh/h	169	898	213	203	624	521	199	517	441	359	438	63
Arrive On Green	0.10	0.31	0.31	0.11	0.33	0.33	0.11	0.28	0.28	0.10	0.27	0.27
Sat Flow, veh/h	1774	2864	678	1792	1881	1571	1792	1845	1575	3476	1610	230
Grp Volume(v), veh/h	146	219	221	169	409	302	165	436	158	270	0	360
Grp Sat Flow(s),veh/h/ln	1774	1784	1758	1792	1881	1571	1792	1845	1575	1738	0	1840
Q Serve(g_s), s	7.1	8.4	8.6	8.0	16.2	13.8	7.9	19.4	7.0	6.6	0.0	15.4
Cycle Q Clear(g_c), s	7.1	8.4	8.6	8.0	16.2	13.8	7.9	19.4	7.0	6.6	0.0	15.4
Prop In Lane	1.00		0.39	1.00		1.00	1.00		1.00	1.00		0.13
Lane Grp Cap(c), veh/h	169	559	551	203	624	521	199	517	441	359	0	501
V/C Ratio(X)	0.86	0.39	0.40	0.83	0.66	0.58	0.83	0.84	0.36	0.75	0.00	0.72
Avail Cap(c_a), veh/h	169	559	551	212	624	521	212	572	488	371	0	549
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	38.8	23.4	23.5	37.8	24.8	24.1	37.9	29.5	25.1	38.0	0.0	28.7
Incr Delay (d2), s/veh	34.1	0.5	0.6	22.9	5.3	4.6	22.1	10.6	0.6	8.2	0.0	4.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.0	4.2	4.3	5.3	9.3	6.6	5.1	11.3	3.1	3.6	0.0	8.4
LnGrp Delay(d),s/veh	72.9	23.9	24.0	60.6	30.1	28.7	60.0	40.1	25.7	46.1	0.0	33.0
LnGrp LOS	E	C	C	E	C	C	E	D	C	D		C
Approach Vol, veh/h		586			880			759			630	
Approach Delay, s/veh		36.2			35.5			41.4			38.6	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.6	31.5	13.4	28.6	12.0	33.1	12.7	29.3
Change Period (Y+Rc), s	3.7	* 4.2	3.7	4.9	3.7	* 4.2	3.7	4.9
Max Green Setting (Gmax), s	10.3	* 27	10.3	26.0	8.3	* 29	9.3	27.0
Max Q Clear Time (g_c+I1), s	10.0	10.6	9.9	17.4	9.1	18.2	8.6	21.4
Green Ext Time (p_c), s	0.0	7.3	0.0	3.8	0.0	5.6	0.1	2.8

Intersection Summary	
HCM 2010 Ctrl Delay	37.9
HCM 2010 LOS	D

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	84	462	138	137	441	0	348	0	133	0	0	0
Number	5	2	12	1	6	16	3	8	18			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1900	1867	1900	1881	1881	0	1881	1863	1900			
Adj Flow Rate, veh/h	85	467	139	138	445	0	352	0	134			
Adj No. of Lanes	1	2	0	1	2	0	2	1	0			
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99			
Percent Heavy Veh, %	0	2	2	1	1	0	1	0	1			
Cap, veh/h	108	1402	414	173	1989	0	534	0	243			
Arrive On Green	0.06	0.52	0.52	0.19	1.00	0.00	0.15	0.00	0.15			
Sat Flow, veh/h	1810	2699	797	1792	3668	0	3476	0	1583			
Grp Volume(v), veh/h	85	306	300	138	445	0	352	0	134			
Grp Sat Flow(s),veh/h/ln	1810	1774	1723	1792	1787	0	1738	0	1583			
Q Serve(g_s), s	2.3	5.0	5.1	3.7	0.0	0.0	4.8	0.0	3.9			
Cycle Q Clear(g_c), s	2.3	5.0	5.1	3.7	0.0	0.0	4.8	0.0	3.9			
Prop In Lane	1.00		0.46	1.00		0.00	1.00		1.00			
Lane Grp Cap(c), veh/h	108	921	895	173	1989	0	534	0	243			
V/C Ratio(X)	0.78	0.33	0.34	0.80	0.22	0.00	0.66	0.00	0.55			
Avail Cap(c_a), veh/h	235	921	895	233	1989	0	1112	0	507			
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.87	0.87	0.87	0.99	0.99	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	23.2	7.0	7.0	19.7	0.0	0.0	19.9	0.0	19.6			
Incr Delay (d2), s/veh	4.0	0.8	0.9	9.1	0.3	0.0	0.5	0.0	0.7			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	1.3	2.6	2.6	2.2	0.1	0.0	2.3	0.0	1.8			
LnGrp Delay(d),s/veh	27.2	7.8	7.9	28.8	0.3	0.0	20.4	0.0	20.3			
LnGrp LOS	C	A	A	C	A		C		C			
Approach Vol, veh/h		691			583			486				
Approach Delay, s/veh		10.2			7.0			20.4				
Approach LOS		B			A			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	8.3	30.0			6.5	31.8		11.7
Change Period (Y+Rc), s	3.5	4.0			3.5	4.0		4.0
Max Green Setting (Gmax), s	6.5	16.0			6.5	16.0		16.0
Max Q Clear Time (g_c+I1), s	5.7	7.1			4.3	2.0		6.8
Green Ext Time (p_c), s	0.0	3.4			0.0	4.3		0.9

Intersection Summary		
HCM 2010 Ctrl Delay		12.0
HCM 2010 LOS		B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	541	54	85	492	0	86	0	110	0	0	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1900	1863	1881	1900	1900	1881	1900	1900	1900	1900
Adj Flow Rate, veh/h	0	558	56	88	507	0	89	0	113	0	0	0
Adj No. of Lanes	0	2	0	1	2	0	0	1	1	0	1	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	0	2	2	2	1	1	0	0	0	0	0	0
Cap, veh/h	0	1949	195	111	2619	0	297	0	173	0	204	0
Arrive On Green	0.00	1.00	1.00	0.06	0.73	0.00	0.11	0.00	0.11	0.00	0.00	0.00
Sat Flow, veh/h	0	3343	325	1774	3668	0	1422	0	1610	0	1900	0
Grp Volume(v), veh/h	0	303	311	88	507	0	89	0	113	0	0	0
Grp Sat Flow(s),veh/h/ln	0	1770	1805	1774	1787	0	1422	0	1610	0	1900	0
Q Serve(g_s), s	0.0	0.0	0.0	2.4	2.2	0.0	3.0	0.0	3.4	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	2.4	2.2	0.0	3.0	0.0	3.4	0.0	0.0	0.0
Prop In Lane	0.00		0.18	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	0	1062	1083	111	2619	0	297	0	173	0	204	0
V/C Ratio(X)	0.00	0.29	0.29	0.79	0.19	0.00	0.30	0.00	0.65	0.00	0.00	0.00
Avail Cap(c_a), veh/h	0	1062	1083	231	2619	0	599	0	515	0	608	0
HCM Platoon Ratio	1.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.94	0.94	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	23.1	2.1	0.0	21.3	0.0	21.4	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.6	0.6	4.6	0.2	0.0	0.2	0.0	1.6	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.2	0.2	1.3	1.1	0.0	1.2	0.0	1.6	0.0	0.0	0.0
LnGrp Delay(d),s/veh	0.0	0.6	0.6	27.7	2.2	0.0	21.5	0.0	23.0	0.0	0.0	0.0
LnGrp LOS		A	A	C	A		C		C			
Approach Vol, veh/h		614			595			202			0	
Approach Delay, s/veh		0.6			6.0			22.3			0.0	
Approach LOS		A			A			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	6.6	34.0		9.4		40.6		9.4
Change Period (Y+Rc), s	3.5	4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s	6.5	16.0		16.0		26.0		16.0
Max Q Clear Time (g_c+I1), s	4.4	2.0		0.0		4.2		5.4
Green Ext Time (p_c), s	0.0	7.0		0.0		8.9		0.3

Intersection Summary		
HCM 2010 Ctrl Delay		6.0
HCM 2010 LOS		A

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	417	0	65	0	1	0	34	25	0	0	22	418
Conflicting Peds, #/hr	0	0	0	0	0	0	2	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	210	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	92	91	92	92	92	91	91	92	92	91	91
Heavy Vehicles, %	2	0	0	0	0	0	4	0	0	0	0	1
Mvmt Flow	458	0	71	0	1	0	37	27	0	0	24	459

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	2	0	0	15	919	2	17	919	1
Stage 1	-	-	-	-	-	-	2	918	-	1	1	-
Stage 2	-	-	-	-	-	-	13	1	-	16	918	-
Critical Hdwy	4.12	-	-	-	-	-	7.14	6.5	-	7.1	6.5	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.14	5.5	-	-	-	-
Follow-up Hdwy	2.218	-	-	-	-	-	3.536	4	-	3.5	4	3.309
Pot Cap-1 Maneuver	1622	-	-	-	-	-	996	273	-	1003	273	1087
Stage 1	-	-	-	-	-	-	-	-	-	1027	899	-
Stage 2	-	-	-	-	-	-	1002	899	-	-	-	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1622	-	-	-	-	-	557	196	-	-	196	1087
Mov Cap-2 Maneuver	-	-	-	-	-	-	280 ~	-739	-	-	~ -71	-
Stage 1	-	-	-	-	-	-	-	-	-	737	899	-
Stage 2	-	-	-	-	-	-	563	899	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	7	0		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	280	-	1622	-	-	-	-	-	-	1087
HCM Lane V/C Ratio	0.133	-	0.283	-	-	-	-	-	-	0.423
HCM Control Delay (s)	19.8	-	8.1	-	-	0	-	-	-	10.7
HCM Lane LOS	C	-	A	-	-	A	-	-	-	B
HCM 95th %tile Q(veh)	0.5	-	1.2	-	-	-	-	-	-	2.1

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	277	22	199	34	13	18	259	1373	10	13	1281	153
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.96	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1869	1900	1863	1763	1900	1900	1845	1900	1900	1881	1881
Adj Flow Rate, veh/h	262	65	209	34	16	19	273	1445	11	14	1348	0
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	7	7	2	5	5	0	3	3	0	1	1
Cap, veh/h	333	72	232	115	46	55	293	1898	14	42	1406	629
Arrive On Green	0.19	0.19	0.19	0.06	0.06	0.06	0.16	0.53	0.53	0.02	0.39	0.00
Sat Flow, veh/h	1774	385	1239	1774	717	852	1810	3566	27	1810	3574	1599
Grp Volume(v), veh/h	262	0	274	34	0	35	273	710	746	14	1348	0
Grp Sat Flow(s),veh/h/ln	1774	0	1625	1774	0	1569	1810	1753	1840	1810	1787	1599
Q Serve(g_s), s	12.4	0.0	14.6	1.6	0.0	1.9	13.2	28.1	28.2	0.7	32.4	0.0
Cycle Q Clear(g_c), s	12.4	0.0	14.6	1.6	0.0	1.9	13.2	28.1	28.2	0.7	32.4	0.0
Prop In Lane	1.00		0.76	1.00		0.54	1.00		0.01	1.00		1.00
Lane Grp Cap(c), veh/h	333	0	305	115	0	101	293	933	979	42	1406	629
V/C Ratio(X)	0.79	0.00	0.90	0.30	0.00	0.34	0.93	0.76	0.76	0.34	0.96	0.00
Avail Cap(c_a), veh/h	333	0	305	141	0	124	293	933	979	150	1420	635
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	34.2	0.0	35.1	39.4	0.0	39.5	36.5	16.2	16.3	42.5	26.1	0.0
Incr Delay (d2), s/veh	12.1	0.0	27.7	2.0	0.0	2.8	35.0	4.1	4.0	4.6	15.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.2	0.0	8.9	0.9	0.0	0.9	9.4	14.5	15.2	0.4	18.9	0.0
LnGrp Delay(d),s/veh	46.3	0.0	62.8	41.4	0.0	42.4	71.6	20.4	20.2	47.1	41.4	0.0
LnGrp LOS	D		E	D		D	E	C	C	D	D	
Approach Vol, veh/h		536			69			1729			1362	
Approach Delay, s/veh		54.7			41.9			28.4			41.4	
Approach LOS		D			D			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.8	18.0	39.6		9.9	5.7	51.9
Change Period (Y+Rc), s		* 4.2	3.7	4.9		4.2	3.7	4.9
Max Green Setting (Gmax), s		* 17	14.3	35.1		7.0	7.3	42.1
Max Q Clear Time (g_c+I1), s		16.6	15.2	34.4		3.9	2.7	30.2
Green Ext Time (p_c), s		0.0	0.0	0.3		0.1	0.0	11.6

Intersection Summary	
HCM 2010 Ctrl Delay	37.3
HCM 2010 LOS	D

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	982	17	17	23	12	52	13	1621	14	54	1472	745
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1723		1715	1775	1615	1805	3534		1805	3574	1583
Flt Permitted	0.95	1.00		0.95	0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1723		1715	1775	1615	1805	3534		1805	3574	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1023	18	18	24	12	54	14	1689	15	56	1533	776
RTOR Reduction (vph)	0	13	0	0	0	51	0	1	0	0	0	0
Lane Group Flow (vph)	1023	23	0	18	18	3	14	1703	0	56	1533	776
Heavy Vehicles (%)	2%	0%	4%	0%	0%	0%	0%	2%	3%	0%	1%	2%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA		Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6						Free
Actuated Green, G (s)	42.7	42.7		7.0	7.0	7.0	3.1	67.4		6.2	71.0	141.2
Effective Green, g (s)	42.7	42.7		7.0	7.0	7.0	3.1	67.4		6.2	71.0	141.2
Actuated g/C Ratio	0.30	0.30		0.05	0.05	0.05	0.02	0.48		0.04	0.50	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)	1038	521		85	87	80	39	1686		79	1797	1583
v/s Ratio Prot	c0.30	0.01		0.01	0.01		0.01	c0.48		0.03	0.43	
v/s Ratio Perm						0.00						c0.49
v/c Ratio	0.99	0.04		0.21	0.21	0.03	0.36	1.01		0.71	0.85	0.49
Uniform Delay, d1	48.9	34.8		64.5	64.4	63.9	68.1	36.9		66.6	30.6	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	24.3	0.1		2.1	2.0	0.3	5.6	24.5		25.1	4.6	1.1
Delay (s)	73.3	34.9		66.6	66.5	64.2	73.6	61.4		91.7	35.1	1.1
Level of Service	E	C		E	E	E	E	E		F	D	A
Approach Delay (s)		72.0			65.1			61.5			25.3	
Approach LOS		E			E			E			C	

Intersection Summary			
HCM 2000 Control Delay	47.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	141.2	Sum of lost time (s)	17.9
Intersection Capacity Utilization	91.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	171	10	20	40	10	30	38	526	18	11	367	78
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.99	0.99		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1887	1900	1900	1800	1863	1881	1846	1900	1827	1851	1900
Adj Flow Rate, veh/h	184	11	22	43	11	32	41	566	19	12	395	84
Adj No. of Lanes	1	1	0	0	1	1	1	2	0	1	2	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	0	0	0	0	2	1	3	3	4	3	3
Cap, veh/h	627	141	282	540	105	396	590	1362	46	541	1135	239
Arrive On Green	0.25	0.25	0.25	0.25	0.25	0.25	0.39	0.39	0.39	0.39	0.39	0.39
Sat Flow, veh/h	1346	558	1116	1006	417	1568	917	3463	116	808	2887	608
Grp Volume(v), veh/h	184	0	33	54	0	32	41	286	299	12	239	240
Grp Sat Flow(s),veh/h/ln	1346	0	1675	1423	0	1568	917	1754	1825	808	1758	1736
Q Serve(g_s), s	2.8	0.0	0.3	0.0	0.0	0.4	0.7	2.7	2.7	0.2	2.2	2.2
Cycle Q Clear(g_c), s	3.3	0.0	0.3	0.5	0.0	0.4	2.9	2.7	2.7	2.9	2.2	2.2
Prop In Lane	1.00		0.67	0.80		1.00	1.00		0.06	1.00		0.35
Lane Grp Cap(c), veh/h	627	0	422	646	0	396	590	690	718	541	692	683
V/C Ratio(X)	0.29	0.00	0.08	0.08	0.00	0.08	0.07	0.42	0.42	0.02	0.35	0.35
Avail Cap(c_a), veh/h	1481	0	1484	1524	0	1390	920	1321	1374	832	1325	1308
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	7.8	0.0	6.4	6.5	0.0	6.4	5.9	5.0	5.0	6.0	4.8	4.8
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.0	0.2	0.3	0.0	0.2	0.2	1.3	1.4	0.1	1.0	1.0
LnGrp Delay(d),s/veh	7.9	0.0	6.5	6.5	0.0	6.5	5.9	5.1	5.1	6.0	4.9	4.9
LnGrp LOS	A		A	A		A	A	A	A	A	A	A
Approach Vol, veh/h		217			86			626			491	
Approach Delay, s/veh		7.7			6.5			5.2			5.0	
Approach LOS		A			A			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		9.7		12.9		9.7		12.9
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		20.0		17.0		20.0		17.0
Max Q Clear Time (g_c+I1), s		5.3		4.9		2.5		4.9
Green Ext Time (p_c), s		0.6		3.6		0.6		3.6

Intersection Summary	
HCM 2010 Ctrl Delay	5.6
HCM 2010 LOS	A

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	0	804	458	59	1116	694
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9	4.9	4.9	4.0
Lane Util. Factor		0.88	1.00	1.00	0.97	1.00
Frt		0.85	1.00	0.85	1.00	1.00
Flt Protected		1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		2760	1863	1509	3335	1759
Flt Permitted		1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		2760	1863	1509	3335	1759
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	874	498	64	1213	754
RTOR Reduction (vph)	0	258	0	9	0	0
Lane Group Flow (vph)	0	616	498	55	1213	754
Heavy Vehicles (%)	0%	3%	2%	7%	5%	8%
Turn Type		Over	NA	Perm	Prot	NA
Protected Phases		3	2		3	Free
Permitted Phases				2		
Actuated Green, G (s)		25.4	20.6	20.6	25.4	55.8
Effective Green, g (s)		25.4	20.6	20.6	25.4	55.8
Actuated g/C Ratio		0.46	0.37	0.37	0.46	1.00
Clearance Time (s)		4.9	4.9	4.9	4.9	
Vehicle Extension (s)		4.5	3.5	3.5	4.5	
Lane Grp Cap (vph)		1256	687	557	1518	1759
v/s Ratio Prot		0.22	c0.27		c0.36	0.43
v/s Ratio Perm				0.04		
v/c Ratio		0.49	0.72	0.10	0.80	0.43
Uniform Delay, d1		10.7	15.2	11.5	13.0	0.0
Progression Factor		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.5	3.9	0.1	3.4	0.8
Delay (s)		11.2	19.1	11.6	16.4	0.8
Level of Service		B	B	B	B	A
Approach Delay (s)	11.2		18.2			10.4
Approach LOS	B		B			B

Intersection Summary			
HCM 2000 Control Delay	11.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	55.8	Sum of lost time (s)	9.8
Intersection Capacity Utilization	64.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	27	747	401	421	683	5	86	5	269	10	17	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		0.95	0.95	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00	1.00		1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.98	1.00
Satd. Flow (prot)	1736	3374	1563	3467	3501		1618	1641	1524		1681	1559
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.98	1.00
Satd. Flow (perm)	1736	3374	1563	3467	3501		1618	1641	1524		1681	1559
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	31	849	456	478	776	6	98	6	306	11	19	38
RTOR Reduction (vph)	0	0	278	0	0	0	0	0	257	0	0	37
Lane Group Flow (vph)	31	849	178	478	782	0	52	52	49	0	30	1
Confl. Peds. (#/hr)	2		1			1	1			1		2
Heavy Vehicles (%)	4%	7%	2%	1%	3%	0%	6%	0%	6%	30%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Over	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	7	7	
Permitted Phases			2									7
Actuated Green, G (s)	1.8	22.6	22.6	9.2	30.1		4.3	4.3	9.2		1.5	1.5
Effective Green, g (s)	1.8	22.6	22.6	9.2	30.1		4.3	4.3	9.2		1.5	1.5
Actuated g/C Ratio	0.03	0.39	0.39	0.16	0.52		0.07	0.07	0.16		0.03	0.03
Clearance Time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Vehicle Extension (s)	1.0	1.3	1.3	1.0	1.3		1.0	1.0	1.0		1.0	1.0
Lane Grp Cap (vph)	53	1314	609	549	1816		119	121	241		43	40
v/s Ratio Prot	0.02	c0.25		c0.14	0.22		c0.03	0.03	0.03		c0.02	
v/s Ratio Perm			0.11									0.00
v/c Ratio	0.58	0.65	0.29	0.87	0.43		0.44	0.43	0.20		0.70	0.02
Uniform Delay, d1	27.7	14.4	12.2	23.8	8.6		25.7	25.7	21.2		28.0	27.5
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	10.2	0.8	0.1	13.7	0.1		0.9	0.9	0.2		32.8	0.1
Delay (s)	37.9	15.3	12.3	37.5	8.7		26.6	26.6	21.4		60.9	27.6
Level of Service	D	B	B	D	A		C	C	C		E	C
Approach Delay (s)		14.8			19.6			22.7			42.3	
Approach LOS		B			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	18.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	58.0	Sum of lost time (s)	20.4
Intersection Capacity Utilization	54.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	133	221	36	131	177	151	23	233	81	298	355	41
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1842	1900	1863	1810	1827	1759	1827	1863	1827	1820	1900
Adj Flow Rate, veh/h	145	240	39	142	192	164	25	253	88	324	386	45
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	2	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	3	3	2	5	4	8	4	2	4	4	4
Cap, veh/h	215	634	102	214	379	321	76	451	388	502	560	65
Arrive On Green	0.12	0.21	0.21	0.12	0.21	0.21	0.05	0.25	0.25	0.15	0.35	0.35
Sat Flow, veh/h	1774	3021	484	1774	1810	1534	1675	1827	1574	3375	1599	186
Grp Volume(v), veh/h	145	138	141	142	192	164	25	253	88	324	0	431
Grp Sat Flow(s),veh/h/ln	1774	1750	1755	1774	1810	1534	1675	1827	1574	1688	0	1785
Q Serve(g_s), s	4.7	4.1	4.2	4.6	5.7	5.7	0.9	7.3	2.7	5.4	0.0	12.5
Cycle Q Clear(g_c), s	4.7	4.1	4.2	4.6	5.7	5.7	0.9	7.3	2.7	5.4	0.0	12.5
Prop In Lane	1.00		0.28	1.00		1.00	1.00		1.00	1.00		0.10
Lane Grp Cap(c), veh/h	215	367	368	214	379	321	76	451	388	502	0	625
V/C Ratio(X)	0.67	0.37	0.38	0.66	0.51	0.51	0.33	0.56	0.23	0.65	0.00	0.69
Avail Cap(c_a), veh/h	274	811	813	274	838	711	223	789	679	577	0	839
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	25.3	20.4	20.4	25.3	21.1	21.1	27.9	19.8	18.1	24.1	0.0	16.8
Incr Delay (d2), s/veh	4.4	0.8	0.8	4.0	1.3	1.5	2.5	1.3	0.4	2.0	0.0	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	2.0	2.1	2.5	3.0	2.5	0.5	3.8	1.2	2.7	0.0	6.4
LnGrp Delay(d),s/veh	29.7	21.2	21.2	29.3	22.3	22.6	30.3	21.2	18.4	26.1	0.0	18.5
LnGrp LOS	C	C	C	C	C	C	C	C	B	C		B
Approach Vol, veh/h		424			498			366			755	
Approach Delay, s/veh		24.1			24.4			21.1			21.8	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.0	16.8	6.4	26.0	11.0	16.8	12.7	19.8
Change Period (Y+Rc), s	3.7	* 4.2	3.7	4.9	3.7	* 4.2	3.7	4.9
Max Green Setting (Gmax), s	9.3	* 28	8.0	28.3	9.3	* 28	10.3	26.0
Max Q Clear Time (g_c+I1), s	6.6	6.2	2.9	14.5	6.7	7.7	7.4	9.3
Green Ext Time (p_c), s	0.1	4.3	0.0	4.2	0.1	4.2	0.3	4.6

Intersection Summary		
HCM 2010 Ctrl Delay		22.8
HCM 2010 LOS		C

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	53	388	83	100	270	0	140	0	77	0	0	0
Number	5	2	12	1	6	16	3	8	18			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1900	1860	1900	1810	1792	0	1810	1696	1900			
Adj Flow Rate, veh/h	58	426	91	110	297	0	154	0	85			
Adj No. of Lanes	1	2	0	1	2	0	2	1	0			
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91			
Percent Heavy Veh, %	0	2	2	5	6	0	5	0	5			
Cap, veh/h	80	1708	362	137	2126	0	340	0	146			
Arrive On Green	0.04	0.59	0.59	0.16	1.00	0.00	0.10	0.00	0.10			
Sat Flow, veh/h	1810	2901	615	1723	3495	0	3343	0	1442			
Grp Volume(v), veh/h	58	258	259	110	297	0	154	0	85			
Grp Sat Flow(s),veh/h/ln	1810	1767	1749	1723	1703	0	1672	0	1442			
Q Serve(g_s), s	1.6	3.5	3.6	3.1	0.0	0.0	2.2	0.0	2.8			
Cycle Q Clear(g_c), s	1.6	3.5	3.6	3.1	0.0	0.0	2.2	0.0	2.8			
Prop In Lane	1.00		0.35	1.00		0.00	1.00		1.00			
Lane Grp Cap(c), veh/h	80	1040	1030	137	2126	0	340	0	146			
V/C Ratio(X)	0.72	0.25	0.25	0.80	0.14	0.00	0.45	0.00	0.58			
Avail Cap(c_a), veh/h	199	1040	1030	224	2126	0	1070	0	461			
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.87	0.87	0.87	1.00	1.00	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	23.6	5.0	5.0	20.6	0.0	0.0	21.2	0.0	21.4			
Incr Delay (d2), s/veh	4.0	0.5	0.5	4.0	0.1	0.0	0.4	0.0	1.4			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.9	1.8	1.9	1.6	0.0	0.0	1.0	0.0	1.2			
LnGrp Delay(d),s/veh	27.6	5.4	5.5	24.7	0.1	0.0	21.5	0.0	22.8			
LnGrp LOS	C	A	A	C	A		C		C			
Approach Vol, veh/h		575			407			239				
Approach Delay, s/veh		7.7			6.8			22.0				
Approach LOS		A			A			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	7.5	33.4			5.7	35.2		9.1
Change Period (Y+Rc), s	3.5	4.0			3.5	4.0		4.0
Max Green Setting (Gmax), s	6.5	16.0			5.5	17.0		16.0
Max Q Clear Time (g_c+I1), s	5.1	5.6			3.6	2.0		4.8
Green Ext Time (p_c), s	0.0	2.8			0.0	3.3		0.5

Intersection Summary		
HCM 2010 Ctrl Delay		10.2
HCM 2010 LOS		B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	373	92	61	338	1	32	0	38	0	0	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	0.99		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1820	1900	1845	1845	1900	1900	1638	1712	1900	1900	1900
Adj Flow Rate, veh/h	0	449	111	73	407	1	39	0	46	0	0	0
Adj No. of Lanes	0	2	0	1	2	0	0	1	1	0	1	0
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	0	4	4	3	3	3	0	0	11	0	0	0
Cap, veh/h	0	1825	448	91	2814	7	212	0	80	0	105	0
Arrive On Green	0.00	0.22	0.22	0.05	0.78	0.78	0.06	0.00	0.06	0.00	0.00	0.00
Sat Flow, veh/h	0	2844	676	1757	3587	9	1228	0	1444	0	1900	0
Grp Volume(v), veh/h	0	281	279	73	199	209	39	0	46	0	0	0
Grp Sat Flow(s),veh/h/ln	0	1729	1700	1757	1753	1843	1228	0	1444	0	1900	0
Q Serve(g_s), s	0.0	6.7	6.8	2.1	1.4	1.4	1.5	0.0	1.6	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	6.7	6.8	2.1	1.4	1.4	1.5	0.0	1.6	0.0	0.0	0.0
Prop In Lane	0.00		0.40	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	0	1146	1127	91	1375	1446	212	0	80	0	105	0
V/C Ratio(X)	0.00	0.24	0.25	0.80	0.14	0.14	0.18	0.00	0.57	0.00	0.00	0.00
Avail Cap(c_a), veh/h	0	1146	1127	193	1375	1446	537	0	462	0	608	0
HCM Platoon Ratio	1.00	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.98	0.98	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	9.2	9.2	23.5	1.3	1.3	23.0	0.0	23.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.5	0.5	6.1	0.2	0.2	0.2	0.0	2.4	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.4	3.4	1.1	0.7	0.8	0.5	0.0	0.7	0.0	0.0	0.0
LnGrp Delay(d),s/veh	0.0	9.7	9.7	29.5	1.5	1.5	23.2	0.0	25.4	0.0	0.0	0.0
LnGrp LOS		A	A	C	A	A	C		C			
Approach Vol, veh/h		560			481			85			0	
Approach Delay, s/veh		9.7			5.8			24.4			0.0	
Approach LOS		A			A			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	6.1	37.1		6.8		43.2		6.8
Change Period (Y+Rc), s	3.5	4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s	5.5	17.0		16.0		26.0		16.0
Max Q Clear Time (g_c+I1), s	4.1	8.8		0.0		3.4		3.6
Green Ext Time (p_c), s	0.0	4.0		0.0		7.2		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	9.1
HCM 2010 LOS	A

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	226	0	16	0	1	0	17	15	0	0	32	328
Conflicting Peds, #/hr	2	0	2	0	0	0	2	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	210	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	1	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	92	80	92	92	92	80	80	92	92	80	80
Heavy Vehicles, %	7	0	0	2	2	2	0	7	0	0	0	2
Mvmt Flow	282	0	20	0	1	0	21	19	0	0	40	410

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	3	0	0	2	0	0	25	570	2	14	570	5
Stage 1	-	-	-	-	-	-	2	567	-	3	3	-
Stage 2	-	-	-	-	-	-	23	3	-	11	567	-
Critical Hdwy	4.17	-	-	-	-	-	7.1	6.57	-	7.1	6.5	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.57	-	-	-	-
Follow-up Hdwy	2.263	-	-	-	-	-	3.5	4.063	-	3.5	4	3.318
Pot Cap-1 Maneuver	1587	-	-	-	-	-	991	425	-	1007	434	1078
Stage 1	-	-	-	-	-	-	-	-	-	1025	897	-
Stage 2	-	-	-	-	-	-	1000	883	-	-	-	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1584	-	-	-	-	-	552	348	-	-	355	1074
Mov Cap-2 Maneuver	-	-	-	-	-	-	349	1134	-	-	~ -626	-
Stage 1	-	-	-	-	-	-	-	-	-	840	896	-
Stage 2	-	-	-	-	-	-	590	882	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	7.3	0		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	349	-	1584	-	-	-	-	-	-	1074
HCM Lane V/C Ratio	0.061	-	0.178	-	-	-	-	-	-	0.382
HCM Control Delay (s)	16	-	7.8	-	-	0	-	-	-	10.4
HCM Lane LOS	C	-	A	-	-	A	-	-	-	B
HCM 95th %tile Q(veh)	0.2	-	0.6	-	-	-	-	-	-	1.8

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	213	40	119	134	38	50	146	1053	37	16	1478	137
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.94	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1869	1900	1900	1842	1900	1827	1840	1900	1357	1827	1845
Adj Flow Rate, veh/h	214	89	137	128	81	57	168	1210	43	18	1699	0
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	3	0	0	0	9	9	4	3	3	40	4	3
Cap, veh/h	290	107	165	151	82	57	163	1829	65	37	1618	731
Arrive On Green	0.16	0.16	0.16	0.08	0.08	0.08	0.09	0.53	0.53	0.03	0.47	0.00
Sat Flow, veh/h	1757	651	1003	1810	977	688	1740	3441	122	1293	3471	1568
Grp Volume(v), veh/h	214	0	226	128	0	138	168	614	639	18	1699	0
Grp Sat Flow(s),veh/h/ln	1757	0	1654	1810	0	1665	1740	1748	1816	1293	1736	1568
Q Serve(g_s), s	10.3	0.0	11.7	6.2	0.0	7.3	8.3	22.5	22.5	1.2	41.3	0.0
Cycle Q Clear(g_c), s	10.3	0.0	11.7	6.2	0.0	7.3	8.3	22.5	22.5	1.2	41.3	0.0
Prop In Lane	1.00		0.61	1.00		0.41	1.00		0.07	1.00		1.00
Lane Grp Cap(c), veh/h	290	0	273	151	0	139	163	929	965	37	1618	731
V/C Ratio(X)	0.74	0.00	0.83	0.85	0.00	0.99	1.03	0.66	0.66	0.49	1.05	0.00
Avail Cap(c_a), veh/h	317	0	299	151	0	139	163	929	965	106	1618	731
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	35.2	0.0	35.8	40.1	0.0	40.6	40.2	15.0	15.0	42.4	23.7	0.0
Incr Delay (d2), s/veh	8.5	0.0	16.8	34.6	0.0	74.0	78.9	2.1	2.1	9.9	36.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.7	0.0	6.6	4.5	0.0	6.2	7.5	11.3	11.7	0.5	27.8	0.0
LnGrp Delay(d),s/veh	43.7	0.0	52.5	74.7	0.0	114.6	119.3	17.1	17.1	52.3	60.5	0.0
LnGrp LOS	D		D	E		F	F	B	B	D	F	
Approach Vol, veh/h		440			266			1421			1717	
Approach Delay, s/veh		48.2			95.4			29.2			60.4	
Approach LOS		D			F			C			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		18.8	12.0	46.2		11.6	6.2	52.0
Change Period (Y+Rc), s		* 4.2	3.7	4.9		4.2	3.7	4.9
Max Green Setting (Gmax), s		* 16	8.3	41.3		7.4	7.3	42.3
Max Q Clear Time (g_c+I1), s		13.7	10.3	43.3		9.3	3.2	24.5
Green Ext Time (p_c), s		0.6	0.0	0.0		0.0	0.0	17.2

Intersection Summary		
HCM 2010 Ctrl Delay	49.9	
HCM 2010 LOS	D	

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	402	5	17	18	14	49	19	1291	10	32	1619	702
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.88		1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.99	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1681		1665	1782	1572	1736	3531		1770	3438	1538
Flt Permitted	0.95	1.00		0.95	0.99	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1681		1665	1782	1572	1736	3531		1770	3438	1538
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	467	6	20	21	16	57	22	1501	12	37	1883	816
RTOR Reduction (vph)	0	17	0	0	0	54	0	0	0	0	0	0
Lane Group Flow (vph)	467	9	0	18	19	3	22	1513	0	37	1883	816
Confl. Peds. (#/hr)				1		1			1	1		
Heavy Vehicles (%)	2%	0%	0%	3%	0%	1%	4%	2%	13%	2%	5%	5%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA		Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6						Free
Actuated Green, G (s)	18.9	18.9		6.8	6.8	6.8	4.5	69.7		4.5	70.2	117.8
Effective Green, g (s)	18.9	18.9		6.8	6.8	6.8	4.5	69.7		4.5	70.2	117.8
Actuated g/C Ratio	0.16	0.16		0.06	0.06	0.06	0.04	0.59		0.04	0.60	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)	550	269		96	102	90	66	2089		67	2048	1538
v/s Ratio Prot	c0.14	0.01		0.01	0.01		0.01	0.43		0.02	c0.55	
v/s Ratio Perm						0.00						c0.53
v/c Ratio	0.85	0.03		0.19	0.19	0.04	0.33	0.72		0.55	0.92	0.53
Uniform Delay, d1	48.1	41.7		52.9	52.9	52.4	55.2	17.2		55.7	21.3	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	12.6	0.1		1.6	1.5	0.3	3.0	1.6		9.5	7.6	1.3
Delay (s)	60.6	41.8		54.5	54.4	52.7	58.2	18.7		65.2	28.8	1.3
Level of Service	E	D		D	D	D	E	B		E	C	A
Approach Delay (s)		59.6			53.4			19.3			21.1	
Approach LOS		E			D			B			C	

Intersection Summary				
HCM 2000 Control Delay	25.1	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.91			
Actuated Cycle Length (s)	117.8	Sum of lost time (s)	17.9	
Intersection Capacity Utilization	70.8%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	54	1	19	9	1	20	17	209	15	76	520	168
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		1.00	1.00		0.99	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1882	1900	1900	1785	1863	1881	1848	1900	1827	1853	1900
Adj Flow Rate, veh/h	70	1	25	12	1	26	22	271	19	99	675	218
Adj No. of Lanes	1	1	0	0	1	1	1	2	0	1	2	0
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Percent Heavy Veh, %	0	0	0	0	0	2	1	3	3	4	3	3
Cap, veh/h	485	7	179	458	21	182	550	1664	116	829	1307	422
Arrive On Green	0.12	0.12	0.12	0.12	0.12	0.12	0.50	0.50	0.50	0.50	0.50	0.50
Sat Flow, veh/h	1392	62	1545	1086	179	1573	626	3330	232	1061	2616	844
Grp Volume(v), veh/h	70	0	26	13	0	26	22	142	148	99	454	439
Grp Sat Flow(s),veh/h/ln	1392	0	1606	1265	0	1573	626	1756	1806	1061	1761	1699
Q Serve(g_s), s	1.0	0.0	0.3	0.0	0.0	0.3	0.5	0.9	0.9	1.2	3.6	3.6
Cycle Q Clear(g_c), s	1.3	0.0	0.3	0.3	0.0	0.3	4.1	0.9	0.9	2.1	3.6	3.6
Prop In Lane	1.00		0.96	0.92		1.00	1.00		0.13	1.00		0.50
Lane Grp Cap(c), veh/h	485	0	186	479	0	182	550	878	903	829	880	849
V/C Ratio(X)	0.14	0.00	0.14	0.03	0.00	0.14	0.04	0.16	0.16	0.12	0.52	0.52
Avail Cap(c_a), veh/h	1661	0	1543	1615	0	1511	748	1434	1475	1165	1438	1388
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	8.9	0.0	8.3	8.2	0.0	8.3	4.9	2.8	2.8	3.4	3.5	3.5
Incr Delay (d2), s/veh	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.1	0.1	0.0	0.1	0.1	0.4	0.5	0.3	1.7	1.6
LnGrp Delay(d),s/veh	8.9	0.0	8.4	8.2	0.0	8.4	4.9	2.9	2.9	3.4	3.7	3.7
LnGrp LOS	A		A	A		A	A	A	A	A	A	A
Approach Vol, veh/h		96			39			312			992	
Approach Delay, s/veh		8.8			8.3			3.0			3.7	
Approach LOS		A			A			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		6.4		14.4		6.4		14.4
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		20.0		17.0		20.0		17.0
Max Q Clear Time (g_c+I1), s		3.3		5.6		2.3		6.1
Green Ext Time (p_c), s		0.2		4.2		0.2		4.1

Intersection Summary		
HCM 2010 Ctrl Delay		4.0
HCM 2010 LOS		A

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	0	930	778	98	936	618
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9	4.9	4.9	4.0
Lane Util. Factor		0.88	1.00	1.00	0.97	1.00
Frt		0.85	1.00	0.85	1.00	1.00
Flt Protected		1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		2814	1863	1553	3467	1881
Flt Permitted		1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		2814	1863	1553	3467	1881
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	989	828	104	996	657
RTOR Reduction (vph)	0	170	0	6	0	0
Lane Group Flow (vph)	0	819	828	98	996	657
Heavy Vehicles (%)	0%	1%	2%	4%	1%	1%
Turn Type		Over	NA	Perm	Prot	NA
Protected Phases		3	2		3	Free
Permitted Phases				2		
Actuated Green, G (s)		20.3	31.1	31.1	20.3	61.2
Effective Green, g (s)		20.3	31.1	31.1	20.3	61.2
Actuated g/C Ratio		0.33	0.51	0.51	0.33	1.00
Clearance Time (s)		4.9	4.9	4.9	4.9	
Vehicle Extension (s)		4.5	3.5	3.5	4.5	
Lane Grp Cap (vph)		933	946	789	1150	1881
v/s Ratio Prot		c0.29	c0.44		0.29	0.35
v/s Ratio Perm				0.06		
v/c Ratio		0.88	0.88	0.12	0.87	0.35
Uniform Delay, d1		19.3	13.3	7.9	19.2	0.0
Progression Factor		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		9.9	9.3	0.1	7.5	0.5
Delay (s)		29.2	22.6	8.0	26.7	0.5
Level of Service		C	C	A	C	A
Approach Delay (s)	29.2		21.0			16.3
Approach LOS	C		C			B

Intersection Summary				
HCM 2000 Control Delay		21.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio		0.88		
Actuated Cycle Length (s)		61.2	Sum of lost time (s)	9.8
Intersection Capacity Utilization		81.6%	ICU Level of Service	D
Analysis Period (min)		15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	810	193	331	635	4	277	17	534	4	23	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		0.95	0.95	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	1.00
Satd. Flow (prot)	1805	3539	1615	3467	3571		1715	1728	1599		1887	1553
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	1.00
Satd. Flow (perm)	1805	3539	1615	3467	3571		1715	1728	1599		1887	1553
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	33	862	205	352	676	4	295	18	568	4	24	19
RTOR Reduction (vph)	0	0	133	0	1	0	0	0	485	0	0	19
Lane Group Flow (vph)	33	862	72	352	679	0	156	157	83	0	28	0
Heavy Vehicles (%)	0%	2%	0%	1%	1%	0%	0%	0%	1%	0%	0%	4%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Over	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	7	7	
Permitted Phases			2									7
Actuated Green, G (s)	1.9	21.8	21.8	9.0	29.0		9.1	9.1	9.0		1.6	1.6
Effective Green, g (s)	1.9	21.8	21.8	9.0	29.0		9.1	9.1	9.0		1.6	1.6
Actuated g/C Ratio	0.03	0.35	0.35	0.15	0.47		0.15	0.15	0.15		0.03	0.03
Clearance Time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Vehicle Extension (s)	1.0	1.3	1.3	1.0	1.3		1.0	1.0	1.0		1.0	1.0
Lane Grp Cap (vph)	55	1246	568	504	1673		252	254	232		48	40
v/s Ratio Prot	0.02	c0.24		c0.10	0.19		c0.09	0.09	0.05		c0.01	
v/s Ratio Perm			0.04									0.00
v/c Ratio	0.60	0.69	0.13	0.70	0.41		0.62	0.62	0.36		0.58	0.01
Uniform Delay, d1	29.6	17.2	13.6	25.2	10.8		24.8	24.8	23.8		29.8	29.4
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	11.2	1.4	0.0	3.4	0.1		3.2	3.1	0.3		11.1	0.0
Delay (s)	40.8	18.5	13.6	28.6	10.9		27.9	27.9	24.2		40.9	29.4
Level of Service	D	B	B	C	B		C	C	C		D	C
Approach Delay (s)		18.3			16.9			25.5			36.3	
Approach LOS		B			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	20.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	61.9	Sum of lost time (s)	20.4
Intersection Capacity Utilization	71.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	143	348	83	175	401	296	162	437	155	265	309	44
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1878	1900	1881	1881	1863	1881	1845	1863	1881	1884	1900
Adj Flow Rate, veh/h	146	355	85	179	409	302	165	446	158	270	315	45
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	2	1	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	1	1	1	1	2	1	3	2	1	1	1
Cap, veh/h	168	881	209	211	622	519	199	522	446	357	442	63
Arrive On Green	0.09	0.31	0.31	0.12	0.33	0.33	0.11	0.28	0.28	0.10	0.27	0.27
Sat Flow, veh/h	1774	2864	678	1792	1881	1571	1792	1845	1575	3476	1610	230
Grp Volume(v), veh/h	146	219	221	179	409	302	165	446	158	270	0	360
Grp Sat Flow(s),veh/h/ln	1774	1784	1758	1792	1881	1571	1792	1845	1575	1738	0	1840
Q Serve(g_s), s	7.1	8.5	8.7	8.6	16.3	13.9	7.9	20.0	7.0	6.6	0.0	15.4
Cycle Q Clear(g_c), s	7.1	8.5	8.7	8.6	16.3	13.9	7.9	20.0	7.0	6.6	0.0	15.4
Prop In Lane	1.00		0.39	1.00		1.00	1.00		1.00	1.00		0.13
Lane Grp Cap(c), veh/h	168	549	541	211	622	519	199	522	446	357	0	505
V/C Ratio(X)	0.87	0.40	0.41	0.85	0.66	0.58	0.83	0.85	0.35	0.76	0.00	0.71
Avail Cap(c_a), veh/h	168	549	541	211	622	519	211	570	486	370	0	547
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	39.0	23.9	24.0	37.8	25.0	24.2	38.0	29.6	25.0	38.1	0.0	28.6
Incr Delay (d2), s/veh	34.8	0.6	0.6	26.2	5.4	4.7	22.3	11.7	0.6	8.4	0.0	4.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.1	4.2	4.3	5.8	9.3	6.7	5.1	11.9	3.1	3.6	0.0	8.4
LnGrp Delay(d),s/veh	73.8	24.5	24.6	64.0	30.4	28.9	60.3	41.3	25.6	46.5	0.0	32.8
LnGrp LOS	E	C	C	E	C	C	E	D	C	D		C
Approach Vol, veh/h		586			890			769			630	
Approach Delay, s/veh		36.8			36.7			42.2			38.7	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.0	31.1	13.4	28.9	12.0	33.1	12.7	29.6
Change Period (Y+Rc), s	3.7	* 4.2	3.7	4.9	3.7	* 4.2	3.7	4.9
Max Green Setting (Gmax), s	10.3	* 27	10.3	26.0	8.3	* 29	9.3	27.0
Max Q Clear Time (g_c+I1), s	10.6	10.7	9.9	17.4	9.1	18.3	8.6	22.0
Green Ext Time (p_c), s	0.0	7.2	0.0	3.9	0.0	5.6	0.1	2.6

Intersection Summary	
HCM 2010 Ctrl Delay	38.6
HCM 2010 LOS	D

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	84	462	138	151	450	0	348	0	151	0	0	0
Number	5	2	12	1	6	16	3	8	18			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1900	1867	1900	1881	1881	0	1881	1863	1900			
Adj Flow Rate, veh/h	85	467	139	153	455	0	352	0	153			
Adj No. of Lanes	1	2	0	1	2	0	2	1	0			
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99			
Percent Heavy Veh, %	0	2	2	1	1	0	1	0	1			
Cap, veh/h	108	1372	406	191	1985	0	538	0	245			
Arrive On Green	0.06	0.51	0.51	0.21	1.00	0.00	0.15	0.00	0.15			
Sat Flow, veh/h	1810	2699	797	1792	3668	0	3476	0	1583			
Grp Volume(v), veh/h	85	306	300	153	455	0	352	0	153			
Grp Sat Flow(s),veh/h/ln	1810	1774	1723	1792	1787	0	1738	0	1583			
Q Serve(g_s), s	2.3	5.1	5.2	4.1	0.0	0.0	4.8	0.0	4.5			
Cycle Q Clear(g_c), s	2.3	5.1	5.2	4.1	0.0	0.0	4.8	0.0	4.5			
Prop In Lane	1.00		0.46	1.00		0.00	1.00		1.00			
Lane Grp Cap(c), veh/h	108	902	876	191	1985	0	538	0	245			
V/C Ratio(X)	0.78	0.34	0.34	0.80	0.23	0.00	0.65	0.00	0.62			
Avail Cap(c_a), veh/h	235	902	876	233	1985	0	1112	0	507			
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.87	0.87	0.87	0.99	0.99	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	23.2	7.3	7.3	19.2	0.0	0.0	19.9	0.0	19.8			
Incr Delay (d2), s/veh	4.0	0.9	0.9	12.1	0.3	0.0	0.5	0.0	1.0			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	1.3	2.7	2.6	2.6	0.1	0.0	2.3	0.0	2.0			
LnGrp Delay(d),s/veh	27.2	8.2	8.2	31.3	0.3	0.0	20.4	0.0	20.7			
LnGrp LOS	C	A	A	C	A		C		C			
Approach Vol, veh/h		691			608			505				
Approach Delay, s/veh		10.5			8.1			20.5				
Approach LOS		B			A			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	8.8	29.4			6.5	31.8		11.7
Change Period (Y+Rc), s	3.5	4.0			3.5	4.0		4.0
Max Green Setting (Gmax), s	6.5	16.0			6.5	16.0		16.0
Max Q Clear Time (g_c+I1), s	6.1	7.2			4.3	2.0		6.8
Green Ext Time (p_c), s	0.0	3.4			0.0	4.4		1.0

Intersection Summary	
HCM 2010 Ctrl Delay	12.5
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	559	54	85	515	0	86	0	110	0	0	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1900	1863	1881	1900	1900	1881	1900	1900	1900	1900
Adj Flow Rate, veh/h	0	576	56	88	531	0	89	0	113	0	0	0
Adj No. of Lanes	0	2	0	1	2	0	0	1	1	0	1	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	0	2	2	2	1	1	0	0	0	0	0	0
Cap, veh/h	0	1956	190	111	2619	0	297	0	173	0	204	0
Arrive On Green	0.00	1.00	1.00	0.06	0.73	0.00	0.11	0.00	0.11	0.00	0.00	0.00
Sat Flow, veh/h	0	3353	316	1774	3668	0	1422	0	1610	0	1900	0
Grp Volume(v), veh/h	0	312	320	88	531	0	89	0	113	0	0	0
Grp Sat Flow(s),veh/h/ln	0	1770	1807	1774	1787	0	1422	0	1610	0	1900	0
Q Serve(g_s), s	0.0	0.0	0.0	2.4	2.3	0.0	3.0	0.0	3.4	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	2.4	2.3	0.0	3.0	0.0	3.4	0.0	0.0	0.0
Prop In Lane	0.00		0.18	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	0	1062	1084	111	2619	0	297	0	173	0	204	0
V/C Ratio(X)	0.00	0.29	0.30	0.79	0.20	0.00	0.30	0.00	0.65	0.00	0.00	0.00
Avail Cap(c_a), veh/h	0	1062	1084	231	2619	0	599	0	515	0	608	0
HCM Platoon Ratio	1.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.93	0.93	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	23.1	2.1	0.0	21.3	0.0	21.4	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.7	0.6	4.6	0.2	0.0	0.2	0.0	1.6	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.2	0.2	1.3	1.2	0.0	1.2	0.0	1.6	0.0	0.0	0.0
LnGrp Delay(d),s/veh	0.0	0.7	0.6	27.7	2.3	0.0	21.5	0.0	23.0	0.0	0.0	0.0
LnGrp LOS		A	A	C	A		C		C			
Approach Vol, veh/h		632			619			202			0	
Approach Delay, s/veh		0.7			5.9			22.3			0.0	
Approach LOS		A			A			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	6.6	34.0		9.4		40.6		9.4
Change Period (Y+Rc), s	3.5	4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s	6.5	16.0		16.0		26.0		16.0
Max Q Clear Time (g_c+I1), s	4.4	2.0		0.0		4.3		5.4
Green Ext Time (p_c), s	0.0	7.3		0.0		9.3		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	5.9
HCM 2010 LOS	A

Intersection

Int Delay, s/veh	3.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	435	0	65	0	1	0	34	25	0	0	22	441
Conflicting Peds, #/hr	0	0	0	0	0	0	2	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	210	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	92	91	92	92	92	91	91	92	92	91	91
Heavy Vehicles, %	2	0	0	0	0	0	4	0	0	0	0	1
Mvmt Flow	478	0	71	0	1	0	37	27	0	0	24	485

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	2	0	0	15	959	2	17	959	1
Stage 1	-	-	-	-	-	-	2	958	-	1	1	-
Stage 2	-	-	-	-	-	-	13	1	-	16	958	-
Critical Hdwy	4.12	-	-	-	-	-	7.14	6.5	-	7.1	6.5	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.14	5.5	-	-	-	-
Follow-up Hdwy	2.218	-	-	-	-	-	3.536	4	-	3.5	4	3.309
Pot Cap-1 Maneuver	1622	-	-	-	-	-	996	259	-	1003	259	1087
Stage 1	-	-	-	-	-	-	-	-	-	1027	899	-
Stage 2	-	-	-	-	-	-	1002	899	-	-	-	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1622	-	-	-	-	-	551	182	-	-	182	1087
Mov Cap-2 Maneuver	-	-	-	-	-	-	266	~ -547	-	-	~ -58	-
Stage 1	-	-	-	-	-	-	-	-	-	724	899	-
Stage 2	-	-	-	-	-	-	540	899	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	7.1	0		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	266	-	1622	-	-	-	-	-	-	1087
HCM Lane V/C Ratio	0.14	-	0.295	-	-	-	-	-	-	0.446
HCM Control Delay (s)	20.7	-	8.1	-	-	0	-	-	-	10.9
HCM Lane LOS	C	-	A	-	-	A	-	-	-	B
HCM 95th %tile Q(veh)	0.5	-	1.2	-	-	-	-	-	-	2.3

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	277	22	212	34	13	18	268	1441	10	13	1357	153
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.96	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1870	1900	1863	1763	1900	1900	1845	1900	1900	1881	1881
Adj Flow Rate, veh/h	269	55	223	34	16	19	282	1517	11	14	1428	0
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	7	7	2	5	5	0	3	3	0	1	1
Cap, veh/h	332	60	242	114	46	55	292	1904	14	42	1414	633
Arrive On Green	0.19	0.19	0.19	0.06	0.06	0.06	0.16	0.53	0.53	0.02	0.40	0.00
Sat Flow, veh/h	1774	319	1295	1774	717	852	1810	3567	26	1810	3574	1599
Grp Volume(v), veh/h	269	0	278	34	0	35	282	745	783	14	1428	0
Grp Sat Flow(s),veh/h/ln	1774	0	1614	1774	0	1569	1810	1753	1840	1810	1787	1599
Q Serve(g_s), s	12.9	0.0	15.0	1.6	0.0	1.9	13.7	30.6	30.6	0.7	35.1	0.0
Cycle Q Clear(g_c), s	12.9	0.0	15.0	1.6	0.0	1.9	13.7	30.6	30.6	0.7	35.1	0.0
Prop In Lane	1.00		0.80	1.00		0.54	1.00		0.01	1.00		1.00
Lane Grp Cap(c), veh/h	332	0	302	114	0	101	292	936	982	42	1414	633
V/C Ratio(X)	0.81	0.00	0.92	0.30	0.00	0.35	0.97	0.80	0.80	0.34	1.01	0.00
Avail Cap(c_a), veh/h	332	0	302	140	0	124	292	936	982	149	1414	633
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	34.6	0.0	35.4	39.6	0.0	39.7	37.0	16.8	16.8	42.7	26.8	0.0
Incr Delay (d2), s/veh	14.3	0.0	32.1	2.0	0.0	2.9	43.6	5.3	5.1	4.7	26.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.6	0.0	9.4	0.9	0.0	0.9	10.3	16.1	16.8	0.4	22.3	0.0
LnGrp Delay(d),s/veh	48.8	0.0	67.5	41.6	0.0	42.6	80.5	22.1	21.9	47.3	53.2	0.0
LnGrp LOS	D		E	D		D	F	C	C	D	F	
Approach Vol, veh/h		547			69			1810			1442	
Approach Delay, s/veh		58.3			42.1			31.1			53.1	
Approach LOS		E			D			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.8	18.0	40.0		9.9	5.7	52.3
Change Period (Y+Rc), s		* 4.2	3.7	4.9		4.2	3.7	4.9
Max Green Setting (Gmax), s		* 17	14.3	35.1		7.0	7.3	42.1
Max Q Clear Time (g_c+I1), s		17.0	15.7	37.1		3.9	2.7	32.6
Green Ext Time (p_c), s		0.0	0.0	0.0		0.1	0.0	9.3

Intersection Summary

HCM 2010 Ctrl Delay	43.4
HCM 2010 LOS	D

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	982	17	17	23	12	52	13	1689	14	54	1548	745
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1723		1715	1775	1615	1805	3534		1805	3574	1583
Flt Permitted	0.95	1.00		0.95	0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1723		1715	1775	1615	1805	3534		1805	3574	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1023	18	18	24	12	54	14	1759	15	56	1612	776
RTOR Reduction (vph)	0	13	0	0	0	51	0	1	0	0	0	0
Lane Group Flow (vph)	1023	23	0	18	18	3	14	1773	0	56	1612	776
Heavy Vehicles (%)	2%	0%	4%	0%	0%	0%	0%	2%	3%	0%	1%	2%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA		Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6						Free
Actuated Green, G (s)	42.7	42.7		7.0	7.0	7.0	3.1	67.3		6.3	71.0	141.2
Effective Green, g (s)	42.7	42.7		7.0	7.0	7.0	3.1	67.3		6.3	71.0	141.2
Actuated g/C Ratio	0.30	0.30		0.05	0.05	0.05	0.02	0.48		0.04	0.50	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)	1038	521		85	87	80	39	1684		80	1797	1583
v/s Ratio Prot	c0.30	0.01		0.01	0.01		0.01	c0.50		0.03	0.45	
v/s Ratio Perm						0.00						c0.49
v/c Ratio	0.99	0.04		0.21	0.21	0.03	0.36	1.05		0.70	0.90	0.49
Uniform Delay, d1	48.9	34.8		64.5	64.4	63.9	68.1	36.9		66.5	31.8	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	24.3	0.1		2.1	2.0	0.3	5.6	37.4		23.4	6.8	1.1
Delay (s)	73.3	34.9		66.6	66.5	64.2	73.6	74.4		90.0	38.6	1.1
Level of Service	E	C		E	E	E	E	E		F	D	A
Approach Delay (s)		72.0			65.1			74.4			27.8	
Approach LOS		E			E			E			C	

Intersection Summary			
HCM 2000 Control Delay	52.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	141.2	Sum of lost time (s)	17.9
Intersection Capacity Utilization	93.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	177	10	20	40	10	30	38	544	18	11	390	85
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.99	0.99		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1887	1900	1900	1800	1863	1881	1846	1900	1827	1851	1900
Adj Flow Rate, veh/h	190	11	22	43	11	32	41	585	19	12	419	91
Adj No. of Lanes	1	1	0	0	1	1	1	2	0	1	2	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	0	0	0	0	2	1	3	3	4	3	3
Cap, veh/h	624	143	286	537	105	402	574	1384	45	530	1148	247
Arrive On Green	0.26	0.26	0.26	0.26	0.26	0.26	0.40	0.40	0.40	0.40	0.40	0.40
Sat Flow, veh/h	1347	558	1117	1010	412	1568	891	3467	113	794	2874	619
Grp Volume(v), veh/h	190	0	33	54	0	32	41	296	308	12	255	255
Grp Sat Flow(s),veh/h/ln	1347	0	1675	1422	0	1568	891	1754	1825	794	1759	1735
Q Serve(g_s), s	2.9	0.0	0.3	0.0	0.0	0.4	0.8	2.8	2.8	0.3	2.4	2.4
Cycle Q Clear(g_c), s	3.5	0.0	0.3	0.5	0.0	0.4	3.2	2.8	2.8	3.1	2.4	2.4
Prop In Lane	1.00		0.67	0.80		1.00	1.00		0.06	1.00		0.36
Lane Grp Cap(c), veh/h	624	0	429	643	0	402	574	700	729	530	702	693
V/C Ratio(X)	0.30	0.00	0.08	0.08	0.00	0.08	0.07	0.42	0.42	0.02	0.36	0.37
Avail Cap(c_a), veh/h	1439	0	1443	1482	0	1351	870	1285	1337	795	1288	1270
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	8.0	0.0	6.6	6.6	0.0	6.6	6.0	5.0	5.0	6.2	4.9	4.9
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	0.0	0.2	0.3	0.0	0.2	0.2	1.3	1.4	0.1	1.2	1.2
LnGrp Delay(d),s/veh	8.1	0.0	6.6	6.6	0.0	6.6	6.1	5.2	5.2	6.2	5.0	5.0
LnGrp LOS	A		A	A		A	A	A	A	A	A	A
Approach Vol, veh/h		223			86			645			522	
Approach Delay, s/veh		7.8			6.6			5.2			5.1	
Approach LOS		A			A			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		9.9		13.3		9.9		13.3
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		20.0		17.0		20.0		17.0
Max Q Clear Time (g_c+I1), s		5.5		5.1		2.5		5.2
Green Ext Time (p_c), s		0.6		3.8		0.6		3.7

Intersection Summary	
HCM 2010 Ctrl Delay	5.6
HCM 2010 LOS	A

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	0	855	539	61	1140	835
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9	4.9	4.9	4.0
Lane Util. Factor		0.88	1.00	1.00	0.97	1.00
Frt		0.85	1.00	0.85	1.00	1.00
Flt Protected		1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		2760	1863	1509	3335	1759
Flt Permitted		1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		2760	1863	1509	3335	1759
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	929	586	66	1239	908
RTOR Reduction (vph)	0	208	0	8	0	0
Lane Group Flow (vph)	0	721	586	58	1239	908
Heavy Vehicles (%)	0%	3%	2%	7%	5%	8%
Turn Type		Over	NA	Perm	Prot	NA
Protected Phases		3	2		3	Free
Permitted Phases				2		
Actuated Green, G (s)		25.4	23.4	23.4	25.4	58.6
Effective Green, g (s)		25.4	23.4	23.4	25.4	58.6
Actuated g/C Ratio		0.43	0.40	0.40	0.43	1.00
Clearance Time (s)		4.9	4.9	4.9	4.9	
Vehicle Extension (s)		4.5	3.5	3.5	4.5	
Lane Grp Cap (vph)		1196	743	602	1445	1759
v/s Ratio Prot		0.26	c0.31		c0.37	0.52
v/s Ratio Perm				0.04		
v/c Ratio		0.60	0.79	0.10	0.86	0.52
Uniform Delay, d1		12.7	15.4	11.0	15.0	0.0
Progression Factor		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		1.1	5.7	0.1	5.6	1.1
Delay (s)		13.9	21.2	11.1	20.6	1.1
Level of Service		B	C	B	C	A
Approach Delay (s)	13.9		20.1			12.4
Approach LOS	B		C			B

Intersection Summary			
HCM 2000 Control Delay	14.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	58.6	Sum of lost time (s)	9.8
Intersection Capacity Utilization	69.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	27	773	401	468	734	5	86	5	294	10	17	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		0.95	0.95	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00	1.00		1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.98	1.00
Satd. Flow (prot)	1736	3374	1563	3467	3501		1618	1641	1524		1681	1558
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.98	1.00
Satd. Flow (perm)	1736	3374	1563	3467	3501		1618	1641	1524		1681	1558
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	31	878	456	532	834	6	98	6	334	11	19	38
RTOR Reduction (vph)	0	0	275	0	0	0	0	0	282	0	0	37
Lane Group Flow (vph)	31	878	181	532	840	0	52	52	52	0	30	1
Confl. Peds. (#/hr)	2		1			1	1			1		2
Heavy Vehicles (%)	4%	7%	2%	1%	3%	0%	6%	0%	6%	30%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Over	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	7	7	
Permitted Phases			2									7
Actuated Green, G (s)	1.8	23.4	23.4	9.2	30.9		4.3	4.3	9.2		1.5	1.5
Effective Green, g (s)	1.8	23.4	23.4	9.2	30.9		4.3	4.3	9.2		1.5	1.5
Actuated g/C Ratio	0.03	0.40	0.40	0.16	0.53		0.07	0.07	0.16		0.03	0.03
Clearance Time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Vehicle Extension (s)	1.0	1.3	1.3	1.0	1.3		1.0	1.0	1.0		1.0	1.0
Lane Grp Cap (vph)	53	1342	622	542	1839		118	120	238		42	39
v/s Ratio Prot	0.02	c0.26		c0.15	0.24		c0.03	0.03	0.03		c0.02	
v/s Ratio Perm			0.12									0.00
v/c Ratio	0.58	0.65	0.29	0.98	0.46		0.44	0.43	0.22		0.71	0.02
Uniform Delay, d1	28.1	14.4	12.1	24.7	8.7		26.1	26.1	21.7		28.4	27.9
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	10.2	0.9	0.1	33.7	0.1		1.0	0.9	0.2		38.0	0.1
Delay (s)	38.3	15.3	12.2	58.4	8.8		27.1	27.0	21.8		66.5	28.0
Level of Service	D	B	B	E	A		C	C	C		E	C
Approach Delay (s)		14.8			28.0			23.1			45.0	
Approach LOS		B			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	22.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	58.8	Sum of lost time (s)	20.4
Intersection Capacity Utilization	56.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	133	229	36	140	183	173	23	294	85	326	468	41
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1842	1900	1863	1810	1827	1759	1827	1863	1827	1821	1900
Adj Flow Rate, veh/h	145	249	39	152	199	188	25	320	92	354	509	45
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	2	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	3	3	2	5	4	8	4	2	4	4	4
Cap, veh/h	202	656	101	204	392	333	75	510	440	465	613	54
Arrive On Green	0.11	0.22	0.22	0.11	0.22	0.22	0.04	0.28	0.28	0.14	0.37	0.37
Sat Flow, veh/h	1774	3038	470	1774	1810	1535	1675	1827	1575	3375	1649	146
Grp Volume(v), veh/h	145	142	146	152	199	188	25	320	92	354	0	554
Grp Sat Flow(s),veh/h/ln	1774	1750	1758	1774	1810	1535	1675	1827	1575	1688	0	1794
Q Serve(g_s), s	5.2	4.5	4.6	5.4	6.3	7.1	0.9	10.0	2.9	6.6	0.0	18.3
Cycle Q Clear(g_c), s	5.2	4.5	4.6	5.4	6.3	7.1	0.9	10.0	2.9	6.6	0.0	18.3
Prop In Lane	1.00		0.27	1.00		1.00	1.00		1.00	1.00		0.08
Lane Grp Cap(c), veh/h	202	378	379	204	392	333	75	510	440	465	0	668
V/C Ratio(X)	0.72	0.38	0.38	0.75	0.51	0.56	0.33	0.63	0.21	0.76	0.00	0.83
Avail Cap(c_a), veh/h	253	748	751	253	773	656	205	728	627	533	0	778
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	27.9	21.9	21.9	28.0	22.5	22.8	30.2	20.6	18.0	27.1	0.0	18.6
Incr Delay (d2), s/veh	7.2	0.7	0.8	9.1	1.2	1.8	2.6	1.5	0.3	5.6	0.0	6.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	2.2	2.3	3.2	3.3	3.2	0.5	5.2	1.3	3.4	0.0	10.2
LnGrp Delay(d),s/veh	35.1	22.6	22.7	37.0	23.7	24.6	32.8	22.1	18.3	32.7	0.0	25.5
LnGrp LOS	D	C	C	D	C	C	C	C	B	C		C
Approach Vol, veh/h		433			539			437			908	
Approach Delay, s/veh		26.8			27.8			21.9			28.3	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.2	18.3	6.6	29.2	11.1	18.4	12.7	23.1
Change Period (Y+Rc), s	3.7	* 4.2	3.7	4.9	3.7	* 4.2	3.7	4.9
Max Green Setting (Gmax), s	9.3	* 28	8.0	28.3	9.3	* 28	10.3	26.0
Max Q Clear Time (g_c+I1), s	7.4	6.6	2.9	20.3	7.2	9.1	8.6	12.0
Green Ext Time (p_c), s	0.1	4.5	0.0	3.8	0.1	4.3	0.2	5.5

Intersection Summary	
HCM 2010 Ctrl Delay	26.7
HCM 2010 LOS	C

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	93	388	83	115	276	20	140	4	85	15	3	31
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1860	1900	1810	1799	1900	1810	1704	1900	1900	1900	1900
Adj Flow Rate, veh/h	102	426	91	126	303	22	154	4	93	16	3	34
Adj No. of Lanes	1	2	0	1	2	0	2	1	0	1	1	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	0	2	2	5	6	6	5	0	0	0	0	0
Cap, veh/h	131	1618	343	158	1865	135	252	11	261	174	7	81
Arrive On Green	0.07	0.56	0.56	0.09	0.58	0.58	0.08	0.19	0.19	0.05	0.05	0.05
Sat Flow, veh/h	1810	2901	615	1723	3233	233	3343	60	1397	1319	133	1502
Grp Volume(v), veh/h	102	258	259	126	159	166	154	0	97	16	0	37
Grp Sat Flow(s),veh/h/ln	1810	1767	1749	1723	1709	1757	1672	0	1457	1319	0	1635
Q Serve(g_s), s	3.9	5.3	5.4	5.0	3.0	3.1	3.1	0.0	4.1	0.8	0.0	1.5
Cycle Q Clear(g_c), s	3.9	5.3	5.4	5.0	3.0	3.1	3.1	0.0	4.1	0.8	0.0	1.5
Prop In Lane	1.00		0.35	1.00		0.13	1.00		0.96	1.00		0.92
Lane Grp Cap(c), veh/h	131	985	975	158	986	1014	252	0	272	174	0	88
V/C Ratio(X)	0.78	0.26	0.27	0.80	0.16	0.16	0.61	0.00	0.36	0.09	0.00	0.42
Avail Cap(c_a), veh/h	142	985	975	160	986	1014	764	0	333	404	0	374
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.85	0.85	0.85	0.99	0.99	0.99	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	31.9	8.0	8.0	31.2	6.9	6.9	31.4	0.0	24.8	31.7	0.0	32.0
Incr Delay (d2), s/veh	16.8	0.5	0.6	22.0	0.3	0.3	0.9	0.0	0.3	0.2	0.0	3.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.5	2.7	2.7	3.3	1.5	1.6	1.5	0.0	1.6	0.3	0.0	0.8
LnGrp Delay(d),s/veh	48.7	8.6	8.6	53.1	7.3	7.3	32.3	0.0	25.1	31.9	0.0	35.2
LnGrp LOS	D	A	A	D	A	A	C		C	C		D
Approach Vol, veh/h		619			451			251			53	
Approach Delay, s/veh		15.2			20.1			29.5			34.2	
Approach LOS		B			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6		8
Phs Duration (G+Y+Rc), s	9.9	43.0	9.3	7.8	8.6	44.4		17.1
Change Period (Y+Rc), s	3.5	4.0	4.0	4.0	3.5	4.0		4.0
Max Green Setting (Gmax), s	6.5	16.0	16.0	16.0	5.5	17.0		16.0
Max Q Clear Time (g_c+I1), s	7.0	7.4	5.1	3.5	5.9	5.1		6.1
Green Ext Time (p_c), s	0.0	2.5	0.2	0.4	0.0	3.0		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	20.1
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	396	92	61	379	1	32	0	38	0	0	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	0.99		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1820	1900	1845	1845	1900	1900	1638	1712	1900	1900	1900
Adj Flow Rate, veh/h	0	477	111	73	457	1	39	0	46	0	0	0
Adj No. of Lanes	0	2	0	1	2	0	0	1	1	0	1	0
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	0	4	4	3	3	3	0	0	11	0	0	0
Cap, veh/h	0	1849	428	91	2815	6	212	0	80	0	105	0
Arrive On Green	0.00	0.66	0.66	0.05	0.78	0.78	0.06	0.00	0.06	0.00	0.00	0.00
Sat Flow, veh/h	0	2880	645	1757	3588	8	1228	0	1444	0	1900	0
Grp Volume(v), veh/h	0	295	293	73	223	235	39	0	46	0	0	0
Grp Sat Flow(s),veh/h/ln	0	1729	1705	1757	1753	1843	1228	0	1444	0	1900	0
Q Serve(g_s), s	0.0	3.5	3.5	2.1	1.6	1.6	1.5	0.0	1.6	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	3.5	3.5	2.1	1.6	1.6	1.5	0.0	1.6	0.0	0.0	0.0
Prop In Lane	0.00		0.38	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	0	1146	1130	91	1375	1446	212	0	80	0	105	0
V/C Ratio(X)	0.00	0.26	0.26	0.80	0.16	0.16	0.18	0.00	0.57	0.00	0.00	0.00
Avail Cap(c_a), veh/h	0	1146	1130	193	1375	1446	537	0	462	0	608	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.97	0.97	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	3.4	3.4	23.5	1.3	1.3	23.0	0.0	23.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.5	0.5	6.1	0.3	0.2	0.2	0.0	2.4	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.8	1.8	1.1	0.8	0.9	0.5	0.0	0.7	0.0	0.0	0.0
LnGrp Delay(d),s/veh	0.0	3.9	4.0	29.5	1.6	1.6	23.2	0.0	25.4	0.0	0.0	0.0
LnGrp LOS		A	A	C	A	A	C		C			
Approach Vol, veh/h		588			531			85			0	
Approach Delay, s/veh		4.0			5.4			24.4			0.0	
Approach LOS		A			A			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	6.1	37.1		6.8		43.2		6.8
Change Period (Y+Rc), s	3.5	4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s	5.5	17.0		16.0		26.0		16.0
Max Q Clear Time (g_c+I1), s	4.1	5.5		0.0		3.6		3.6
Green Ext Time (p_c), s	0.0	5.5		0.0		8.0		0.1

Intersection Summary		
HCM 2010 Ctrl Delay		6.0
HCM 2010 LOS		A

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	249	0	16	0	1	0	17	15	0	0	32	369
Conflicting Peds, #/hr	2	0	2	0	0	0	2	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	210	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	1	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	92	80	92	92	92	80	80	92	92	80	80
Heavy Vehicles, %	7	0	0	2	2	2	0	7	0	0	0	2
Mvmt Flow	311	0	20	0	1	0	21	19	0	0	40	461

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	3	0	0	2	0	0	25	628	2	14	628	5
Stage 1	-	-	-	-	-	-	2	625	-	3	3	-
Stage 2	-	-	-	-	-	-	23	3	-	11	625	-
Critical Hdwy	4.17	-	-	-	-	-	7.1	6.57	-	7.1	6.5	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.57	-	-	-	-
Follow-up Hdwy	2.263	-	-	-	-	-	3.5	4.063	-	3.5	4	3.318
Pot Cap-1 Maneuver	1587	-	-	-	-	-	991	393	-	1007	402	1078
Stage 1	-	-	-	-	-	-	-	-	-	1025	897	-
Stage 2	-	-	-	-	-	-	1000	883	-	-	-	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1584	-	-	-	-	-	515	315	-	-	322	1074
Mov Cap-2 Maneuver	-	-	-	-	-	-	304	1518	-	-	~ -380	-
Stage 1	-	-	-	-	-	-	-	-	-	822	896	-
Stage 2	-	-	-	-	-	-	544	882	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	7.4	0		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	304	-	1584	-	-	-	-	-	-	1074
HCM Lane V/C Ratio	0.07	-	0.196	-	-	-	-	-	-	0.429
HCM Control Delay (s)	17.7	-	7.8	-	-	0	-	-	-	10.9
HCM Lane LOS	C	-	A	-	-	A	-	-	-	B
HCM 95th %tile Q(veh)	0.2	-	0.7	-	-	-	-	-	-	2.2

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	213	40	129	134	38	50	159	1172	37	16	1633	137
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.94	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1868	1900	1900	1842	1900	1827	1840	1900	1357	1827	1845
Adj Flow Rate, veh/h	220	82	148	128	81	57	183	1347	43	18	1877	0
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	3	0	0	0	9	9	4	3	3	40	4	3
Cap, veh/h	293	98	177	151	81	57	163	1832	58	37	1614	729
Arrive On Green	0.17	0.17	0.17	0.08	0.08	0.08	0.09	0.53	0.53	0.03	0.46	0.00
Sat Flow, veh/h	1757	586	1057	1810	977	688	1740	3456	110	1293	3471	1568
Grp Volume(v), veh/h	220	0	230	128	0	138	183	681	709	18	1877	0
Grp Sat Flow(s),veh/h/ln	1757	0	1643	1810	0	1665	1740	1748	1818	1293	1736	1568
Q Serve(g_s), s	10.6	0.0	12.0	6.2	0.0	7.4	8.3	26.6	26.7	1.2	41.3	0.0
Cycle Q Clear(g_c), s	10.6	0.0	12.0	6.2	0.0	7.4	8.3	26.6	26.7	1.2	41.3	0.0
Prop In Lane	1.00		0.64	1.00		0.41	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	293	0	274	151	0	139	163	927	964	37	1614	729
V/C Ratio(X)	0.75	0.00	0.84	0.85	0.00	1.00	1.13	0.73	0.74	0.49	1.16	0.00
Avail Cap(c_a), veh/h	316	0	296	151	0	139	163	927	964	106	1614	729
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	35.2	0.0	35.8	40.2	0.0	40.7	40.3	16.1	16.1	42.5	23.8	0.0
Incr Delay (d2), s/veh	9.3	0.0	18.2	35.1	0.0	74.9	108.4	3.5	3.4	9.9	80.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.9	0.0	6.8	4.6	0.0	6.2	8.8	13.6	14.1	0.5	37.6	0.0
LnGrp Delay(d),s/veh	44.6	0.0	54.1	75.3	0.0	115.6	148.6	19.5	19.5	52.5	104.4	0.0
LnGrp LOS	D		D	E		F	F	B	B	D	F	
Approach Vol, veh/h		450			266			1573			1895	
Approach Delay, s/veh		49.4			96.2			34.5			103.9	
Approach LOS		D			F			C			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		19.0	12.0	46.2		11.6	6.2	52.0
Change Period (Y+Rc), s		* 4.2	3.7	4.9		4.2	3.7	4.9
Max Green Setting (Gmax), s		* 16	8.3	41.3		7.4	7.3	42.3
Max Q Clear Time (g_c+I1), s		14.0	10.3	43.3		9.4	3.2	28.7
Green Ext Time (p_c), s		0.5	0.0	0.0		0.0	0.0	13.4

Intersection Summary	
HCM 2010 Ctrl Delay	71.5
HCM 2010 LOS	E

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	402	5	17	18	14	49	19	1410	10	32	1774	702
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.88		1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.99	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1681		1665	1782	1572	1736	3532		1770	3438	1538
Flt Permitted	0.95	1.00		0.95	0.99	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1681		1665	1782	1572	1736	3532		1770	3438	1538
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	467	6	20	21	16	57	22	1640	12	37	2063	816
RTOR Reduction (vph)	0	17	0	0	0	54	0	0	0	0	0	0
Lane Group Flow (vph)	467	9	0	18	19	3	22	1652	0	37	2063	816
Confl. Peds. (#/hr)				1		1			1	1		
Heavy Vehicles (%)	2%	0%	0%	3%	0%	1%	4%	2%	13%	2%	5%	5%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA		Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6						Free
Actuated Green, G (s)	18.9	18.9		6.8	6.8	6.8	4.5	69.7		4.5	70.2	117.8
Effective Green, g (s)	18.9	18.9		6.8	6.8	6.8	4.5	69.7		4.5	70.2	117.8
Actuated g/C Ratio	0.16	0.16		0.06	0.06	0.06	0.04	0.59		0.04	0.60	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)	550	269		96	102	90	66	2089		67	2048	1538
v/s Ratio Prot	c0.14	0.01		0.01	0.01		0.01	0.47		0.02	c0.60	
v/s Ratio Perm						0.00						c0.53
v/c Ratio	0.85	0.03		0.19	0.19	0.04	0.33	0.79		0.55	1.01	0.53
Uniform Delay, d1	48.1	41.7		52.9	52.9	52.4	55.2	18.5		55.7	23.8	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	12.6	0.1		1.6	1.5	0.3	3.0	2.4		9.5	21.7	1.3
Delay (s)	60.6	41.8		54.5	54.4	52.7	58.2	20.9		65.2	45.5	1.3
Level of Service	E	D		D	D	D	E	C		E	D	A
Approach Delay (s)		59.6			53.4			21.4			33.4	
Approach LOS		E			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	32.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	117.8	Sum of lost time (s)	17.9
Intersection Capacity Utilization	75.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM 2010 Signalized Intersection Summary
9: Carmel Rancho Blvd & Shopping Center Dwy

Cum + Proj Alt 1 AM.syn
3/14/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	56	1	19	9	1	20	17	232	15	76	561	174
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		1.00	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1882	1900	1900	1785	1863	1881	1848	1900	1827	1853	1900
Adj Flow Rate, veh/h	73	1	25	12	1	26	22	301	19	99	729	226
Adj No. of Lanes	1	1	0	0	1	1	1	2	0	1	2	0
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Percent Heavy Veh, %	0	0	0	0	0	2	1	3	3	4	3	3
Cap, veh/h	475	7	179	447	24	183	527	1720	108	814	1356	420
Arrive On Green	0.12	0.12	0.12	0.12	0.12	0.12	0.51	0.51	0.51	0.51	0.51	0.51
Sat Flow, veh/h	1392	62	1545	1086	205	1573	591	3354	211	1033	2644	820
Grp Volume(v), veh/h	73	0	26	13	0	26	22	157	163	99	485	470
Grp Sat Flow(s),veh/h/ln	1392	0	1606	1291	0	1573	591	1755	1810	1033	1761	1704
Q Serve(g_s), s	1.1	0.0	0.3	0.0	0.0	0.3	0.6	1.0	1.0	1.2	4.0	4.0
Cycle Q Clear(g_c), s	1.4	0.0	0.3	0.3	0.0	0.3	4.6	1.0	1.0	2.3	4.0	4.0
Prop In Lane	1.00		0.96	0.92		1.00	1.00		0.12	1.00		0.48
Lane Grp Cap(c), veh/h	475	0	187	471	0	183	527	900	928	814	903	874
V/C Ratio(X)	0.15	0.00	0.14	0.03	0.00	0.14	0.04	0.17	0.18	0.12	0.54	0.54
Avail Cap(c_a), veh/h	1605	0	1490	1563	0	1459	690	1384	1427	1098	1388	1344
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	9.2	0.0	8.6	8.5	0.0	8.6	5.1	2.8	2.8	3.4	3.5	3.5
Incr Delay (d2), s/veh	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.1	0.1	0.0	0.1	0.1	0.5	0.5	0.3	1.9	1.9
LnGrp Delay(d),s/veh	9.2	0.0	8.7	8.5	0.0	8.7	5.1	2.8	2.8	3.4	3.7	3.7
LnGrp LOS	A		A	A		A	A	A	A	A	A	A
Approach Vol, veh/h		99			39			342			1054	
Approach Delay, s/veh		9.1			8.6			3.0			3.7	
Approach LOS		A			A			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		6.5		15.1		6.5		15.1
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		20.0		17.0		20.0		17.0
Max Q Clear Time (g_c+I1), s		3.4		6.0		2.3		6.6
Green Ext Time (p_c), s		0.2		4.5		0.2		4.4

Intersection Summary		
HCM 2010 Ctrl Delay		4.0
HCM 2010 LOS		A

HCM Signalized Intersection Capacity Analysis
1: SR 1 & Carmel Valley Rd

Cum + Proj Alt 1 PM.syn
3/14/2016

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	0	968	975	105	993	771
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9	4.9	4.9	4.0
Lane Util. Factor		0.88	1.00	1.00	0.97	1.00
Frt		0.85	1.00	0.85	1.00	1.00
Flt Protected		1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		2814	1863	1553	3467	1881
Flt Permitted		1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		2814	1863	1553	3467	1881
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	1030	1037	112	1056	820
RTOR Reduction (vph)	0	104	0	5	0	0
Lane Group Flow (vph)	0	926	1037	107	1056	820
Heavy Vehicles (%)	0%	1%	2%	4%	1%	1%
Turn Type		Over	NA	Perm	Prot	NA
Protected Phases		3	2		3	Free
Permitted Phases				2		
Actuated Green, G (s)		20.1	35.1	35.1	20.1	65.0
Effective Green, g (s)		20.1	35.1	35.1	20.1	65.0
Actuated g/C Ratio		0.31	0.54	0.54	0.31	1.00
Clearance Time (s)		4.9	4.9	4.9	4.9	
Vehicle Extension (s)		4.5	3.5	3.5	4.5	
Lane Grp Cap (vph)		870	1006	838	1072	1881
v/s Ratio Prot		c0.33	c0.56		0.30	0.44
v/s Ratio Perm				0.07		
v/c Ratio		1.06	1.03	0.13	0.99	0.44
Uniform Delay, d1		22.4	14.9	7.4	22.3	0.0
Progression Factor		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		49.3	36.6	0.1	23.8	0.7
Delay (s)		71.7	51.5	7.5	46.1	0.7
Level of Service		E	D	A	D	A
Approach Delay (s)	71.7		47.2			26.3
Approach LOS	E		D			C

Intersection Summary				
HCM 2000 Control Delay		43.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio		1.04		
Actuated Cycle Length (s)		65.0	Sum of lost time (s)	9.8
Intersection Capacity Utilization		93.3%	ICU Level of Service	F
Analysis Period (min)		15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	874	193	400	673	4	277	17	601	4	23	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		0.95	0.95	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	1.00
Satd. Flow (prot)	1805	3539	1615	3467	3571		1715	1728	1599		1887	1553
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	1.00
Satd. Flow (perm)	1805	3539	1615	3467	3571		1715	1728	1599		1887	1553
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	33	930	205	426	716	4	295	18	639	4	24	19
RTOR Reduction (vph)	0	0	121	0	1	0	0	0	536	0	0	19
Lane Group Flow (vph)	33	930	84	426	719	0	156	157	103	0	28	0
Heavy Vehicles (%)	0%	2%	0%	1%	1%	0%	0%	0%	1%	0%	0%	4%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Over	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	7	7	
Permitted Phases			2									7
Actuated Green, G (s)	1.9	23.9	23.9	9.0	31.1		9.2	9.2	9.0		1.6	1.6
Effective Green, g (s)	1.9	23.9	23.9	9.0	31.1		9.2	9.2	9.0		1.6	1.6
Actuated g/C Ratio	0.03	0.37	0.37	0.14	0.49		0.14	0.14	0.14		0.02	0.02
Clearance Time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Vehicle Extension (s)	1.0	1.3	1.3	1.0	1.3		1.0	1.0	1.0		1.0	1.0
Lane Grp Cap (vph)	53	1319	602	486	1732		246	248	224		47	38
v/s Ratio Prot	0.02	c0.26		c0.12	0.20		c0.09	0.09	0.06		c0.01	
v/s Ratio Perm			0.05									0.00
v/c Ratio	0.62	0.71	0.14	0.88	0.42		0.63	0.63	0.46		0.60	0.01
Uniform Delay, d1	30.7	17.1	13.3	27.0	10.6		25.9	25.9	25.3		30.9	30.5
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	15.2	1.4	0.0	15.7	0.1		3.9	3.8	0.5		12.8	0.0
Delay (s)	46.0	18.5	13.3	42.7	10.7		29.8	29.7	25.9		43.7	30.5
Level of Service	D	B	B	D	B		C	C	C		D	C
Approach Delay (s)		18.4			22.6			27.1			38.4	
Approach LOS		B			C			C			D	

Intersection Summary				
HCM 2000 Control Delay	22.6	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.72			
Actuated Cycle Length (s)	64.1	Sum of lost time (s)	20.4	
Intersection Capacity Utilization	76.9%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	143	367	83	190	418	356	162	581	164	330	397	44
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1878	1900	1881	1881	1863	1881	1845	1863	1881	1883	1900
Adj Flow Rate, veh/h	146	374	85	194	427	363	165	593	167	337	405	45
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	2	1	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	1	1	1	1	2	1	3	2	1	1	1
Cap, veh/h	164	865	195	205	604	504	198	553	473	359	487	54
Arrive On Green	0.09	0.30	0.30	0.11	0.32	0.32	0.11	0.30	0.30	0.10	0.29	0.29
Sat Flow, veh/h	1774	2896	651	1792	1881	1571	1792	1845	1575	3476	1664	185
Grp Volume(v), veh/h	146	229	230	194	427	363	165	593	167	337	0	450
Grp Sat Flow(s),veh/h/ln	1774	1784	1763	1792	1881	1571	1792	1845	1575	1738	0	1849
Q Serve(g_s), s	7.3	9.3	9.5	9.7	17.9	18.4	8.1	27.0	7.5	8.7	0.0	20.5
Cycle Q Clear(g_c), s	7.3	9.3	9.5	9.7	17.9	18.4	8.1	27.0	7.5	8.7	0.0	20.5
Prop In Lane	1.00		0.37	1.00		1.00	1.00		1.00	1.00		0.10
Lane Grp Cap(c), veh/h	164	533	527	205	604	504	198	553	473	359	0	541
V/C Ratio(X)	0.89	0.43	0.44	0.95	0.71	0.72	0.83	1.07	0.35	0.94	0.00	0.83
Avail Cap(c_a), veh/h	164	533	527	205	604	504	205	553	473	359	0	541
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	40.4	25.4	25.4	39.6	26.8	27.0	39.2	31.5	24.7	40.1	0.0	29.8
Incr Delay (d2), s/veh	41.0	0.7	0.7	47.6	6.8	8.6	23.7	58.9	0.5	32.0	0.0	10.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.4	4.7	4.7	7.5	10.4	9.2	5.3	22.7	3.3	5.8	0.0	12.0
LnGrp Delay(d),s/veh	81.5	26.0	26.1	87.2	33.7	35.5	62.9	90.4	25.2	72.1	0.0	40.6
LnGrp LOS	F	C	C	F	C	D	E	F	C	E		D
Approach Vol, veh/h		605			984			925			787	
Approach Delay, s/veh		39.4			44.9			73.7			54.1	
Approach LOS		D			D			E			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.0	31.1	13.7	31.2	12.0	33.1	13.0	31.9
Change Period (Y+Rc), s	3.7	* 4.2	3.7	4.9	3.7	* 4.2	3.7	4.9
Max Green Setting (Gmax), s	10.3	* 27	10.3	26.0	8.3	* 29	9.3	27.0
Max Q Clear Time (g_c+I1), s	11.7	11.5	10.1	22.5	9.3	20.4	10.7	29.0
Green Ext Time (p_c), s	0.0	7.6	0.0	2.3	0.0	5.1	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	54.2
HCM 2010 LOS	D

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	177	462	138	163	456	47	348	9	169	43	8	86
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1867	1900	1881	1883	1900	1881	1865	1900	1900	1900	1900
Adj Flow Rate, veh/h	179	467	139	165	461	47	352	9	171	43	8	87
Adj No. of Lanes	1	2	0	1	2	0	2	1	0	1	1	0
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	0	2	2	1	1	1	1	0	0	0	0	0
Cap, veh/h	168	1233	364	166	1498	152	461	23	434	221	13	142
Arrive On Green	0.09	0.46	0.46	0.09	0.46	0.46	0.13	0.29	0.29	0.10	0.10	0.10
Sat Flow, veh/h	1810	2698	797	1792	3278	333	3476	80	1517	1223	136	1481
Grp Volume(v), veh/h	179	306	300	165	251	257	352	0	180	43	0	95
Grp Sat Flow(s),veh/h/ln	1810	1774	1722	1792	1789	1822	1738	0	1597	1223	0	1617
Q Serve(g_s), s	6.5	7.9	8.0	6.4	6.2	6.2	6.8	0.0	6.4	2.3	0.0	3.9
Cycle Q Clear(g_c), s	6.5	7.9	8.0	6.4	6.2	6.2	6.8	0.0	6.4	2.3	0.0	3.9
Prop In Lane	1.00		0.46	1.00		0.18	1.00		0.95	1.00		0.92
Lane Grp Cap(c), veh/h	168	810	787	166	817	833	461	0	457	221	0	156
V/C Ratio(X)	1.07	0.38	0.38	0.99	0.31	0.31	0.76	0.00	0.39	0.19	0.00	0.61
Avail Cap(c_a), veh/h	168	810	787	166	817	833	794	0	457	382	0	370
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.78	0.78	0.78	0.98	0.98	0.98	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	31.8	12.5	12.5	31.7	12.0	12.0	29.3	0.0	20.1	29.6	0.0	30.4
Incr Delay (d2), s/veh	79.8	1.0	1.1	66.6	1.0	0.9	1.0	0.0	0.2	0.4	0.0	3.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.9	4.1	4.0	6.2	3.3	3.4	3.3	0.0	2.8	0.8	0.0	1.9
LnGrp Delay(d),s/veh	111.5	13.5	13.6	98.3	13.0	13.0	30.3	0.0	20.3	30.1	0.0	34.2
LnGrp LOS	F	B	B	F	B	B	C		C	C		C
Approach Vol, veh/h		785			673			532			138	
Approach Delay, s/veh		35.9			33.9			26.9			32.9	
Approach LOS		D			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6		8
Phs Duration (G+Y+Rc), s	10.0	36.0	13.3	10.7	10.0	36.0		24.0
Change Period (Y+Rc), s	3.5	4.0	4.0	4.0	3.5	4.0		4.0
Max Green Setting (Gmax), s	6.5	16.0	16.0	16.0	6.5	16.0		16.0
Max Q Clear Time (g_c+I1), s	8.4	10.0	8.8	5.9	8.5	8.2		8.4
Green Ext Time (p_c), s	0.0	2.6	0.4	0.5	0.0	3.1		0.9

Intersection Summary	
HCM 2010 Ctrl Delay	32.8
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	620	54	85	580	0	86	0	110	0	0	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1900	1863	1881	1900	1900	1881	1900	1900	1900	1900
Adj Flow Rate, veh/h	0	639	56	88	598	0	89	0	113	0	0	0
Adj No. of Lanes	0	2	0	1	2	0	0	1	1	0	1	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	0	2	2	2	1	1	0	0	0	0	0	0
Cap, veh/h	0	1976	173	111	2619	0	297	0	173	0	204	0
Arrive On Green	0.00	0.60	0.60	0.06	0.73	0.00	0.11	0.00	0.11	0.00	0.00	0.00
Sat Flow, veh/h	0	3386	288	1774	3668	0	1422	0	1610	0	1900	0
Grp Volume(v), veh/h	0	343	352	88	598	0	89	0	113	0	0	0
Grp Sat Flow(s),veh/h/ln	0	1770	1812	1774	1787	0	1422	0	1610	0	1900	0
Q Serve(g_s), s	0.0	4.8	4.8	2.4	2.7	0.0	3.0	0.0	3.4	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	4.8	4.8	2.4	2.7	0.0	3.0	0.0	3.4	0.0	0.0	0.0
Prop In Lane	0.00		0.16	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	0	1062	1087	111	2619	0	297	0	173	0	204	0
V/C Ratio(X)	0.00	0.32	0.32	0.79	0.23	0.00	0.30	0.00	0.65	0.00	0.00	0.00
Avail Cap(c_a), veh/h	0	1062	1087	231	2619	0	599	0	515	0	608	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.88	0.88	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	5.0	5.0	23.1	2.1	0.0	21.3	0.0	21.4	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.7	0.7	4.6	0.2	0.0	0.2	0.0	1.6	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	2.5	2.6	1.3	1.3	0.0	1.2	0.0	1.6	0.0	0.0	0.0
LnGrp Delay(d),s/veh	0.0	5.7	5.7	27.7	2.3	0.0	21.5	0.0	23.0	0.0	0.0	0.0
LnGrp LOS		A	A	C	A		C		C			
Approach Vol, veh/h		695			686			202			0	
Approach Delay, s/veh		5.7			5.6			22.3			0.0	
Approach LOS		A			A			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	6.6	34.0		9.4		40.6		9.4
Change Period (Y+Rc), s	3.5	4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s	6.5	16.0		16.0		26.0		16.0
Max Q Clear Time (g_c+I1), s	4.4	6.8		0.0		4.7		5.4
Green Ext Time (p_c), s	0.0	5.9		0.0		10.4		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	7.8
HCM 2010 LOS	A

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	496	0	65	0	1	0	34	25	0	0	22	506
Conflicting Peds, #/hr	0	0	0	0	0	0	2	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	210	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	92	91	92	92	92	91	91	92	92	91	91
Heavy Vehicles, %	2	0	0	0	0	0	4	0	0	0	0	1
Mvmt Flow	545	0	71	0	1	0	37	27	0	0	24	556

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	2	0	0	15	1093	2	17	1093	1
Stage 1	-	-	-	-	-	-	2	1092	-	1	1	-
Stage 2	-	-	-	-	-	-	13	1	-	16	1092	-
Critical Hdwy	4.12	-	-	-	-	-	7.14	6.5	-	7.1	6.5	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.14	5.5	-	-	-	-
Follow-up Hdwy	2.218	-	-	-	-	-	3.536	4	-	3.5	4	3.309
Pot Cap-1 Maneuver	1622	-	-	-	-	-	996	216	-	1003	216	1087
Stage 1	-	-	-	-	-	-	-	-	-	1027	899	-
Stage 2	-	-	-	-	-	-	1002	899	-	-	-	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1622	-	-	-	-	-	547	143	-	-	143	1087
Mov Cap-2 Maneuver	-	-	-	-	-	-	235	~ -283	-	-	~ -32	-
Stage 1	-	-	-	-	-	-	-	-	-	682	899	-
Stage 2	-	-	-	-	-	-	476	899	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	7.4	0		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	235	-	1622	-	-	-	-	-	-	1087
HCM Lane V/C Ratio	0.159	-	0.336	-	-	-	-	-	-	0.512
HCM Control Delay (s)	23.2	-	8.3	-	-	0	-	-	-	11.7
HCM Lane LOS	C	-	A	-	-	A	-	-	-	B
HCM 95th %tile Q(veh)	0.6	-	1.5	-	-	-	-	-	-	3

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	277	22	232	34	13	18	285	1659	10	13	1547	153
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.96	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1871	1900	1863	1763	1900	1900	1845	1900	1900	1881	1881
Adj Flow Rate, veh/h	280	40	244	34	16	19	300	1746	11	14	1628	0
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	7	7	2	5	5	0	3	3	0	1	1
Cap, veh/h	332	42	257	114	46	55	292	1906	12	42	1414	633
Arrive On Green	0.19	0.19	0.19	0.06	0.06	0.06	0.16	0.53	0.53	0.02	0.40	0.00
Sat Flow, veh/h	1774	225	1374	1774	717	852	1810	3571	22	1810	3574	1599
Grp Volume(v), veh/h	280	0	284	34	0	35	300	856	901	14	1628	0
Grp Sat Flow(s),veh/h/ln	1774	0	1599	1774	0	1569	1810	1753	1841	1810	1787	1599
Q Serve(g_s), s	13.5	0.0	15.6	1.6	0.0	1.9	14.3	39.5	39.6	0.7	35.1	0.0
Cycle Q Clear(g_c), s	13.5	0.0	15.6	1.6	0.0	1.9	14.3	39.5	39.6	0.7	35.1	0.0
Prop In Lane	1.00		0.86	1.00		0.54	1.00		0.01	1.00		1.00
Lane Grp Cap(c), veh/h	332	0	299	114	0	101	292	936	983	42	1414	633
V/C Ratio(X)	0.84	0.00	0.95	0.30	0.00	0.35	1.03	0.92	0.92	0.34	1.15	0.00
Avail Cap(c_a), veh/h	332	0	299	140	0	124	292	936	983	149	1414	633
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	34.8	0.0	35.6	39.6	0.0	39.7	37.2	18.9	18.9	42.7	26.8	0.0
Incr Delay (d2), s/veh	17.9	0.0	38.6	2.0	0.0	2.9	60.3	13.7	13.3	4.7	76.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.3	0.0	10.1	0.9	0.0	0.9	11.9	22.3	23.6	0.4	32.1	0.0
LnGrp Delay(d),s/veh	52.7	0.0	74.3	41.6	0.0	42.6	97.5	32.5	32.2	47.3	103.5	0.0
LnGrp LOS	D		E	D		D	F	C	C	D	F	
Approach Vol, veh/h		564			69			2057			1642	
Approach Delay, s/veh		63.6			42.1			41.9			103.0	
Approach LOS		E			D			D			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.8	18.0	40.0		9.9	5.7	52.3
Change Period (Y+Rc), s		* 4.2	3.7	4.9		4.2	3.7	4.9
Max Green Setting (Gmax), s		* 17	14.3	35.1		7.0	7.3	42.1
Max Q Clear Time (g_c+I1), s		17.6	16.3	37.1		3.9	2.7	41.6
Green Ext Time (p_c), s		0.0	0.0	0.0		0.1	0.0	0.5

Intersection Summary	
HCM 2010 Ctrl Delay	67.9
HCM 2010 LOS	E

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	982	17	17	23	12	52	13	1907	14	54	1738	745
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1723		1715	1775	1615	1805	3535		1805	3574	1583
Flt Permitted	0.95	1.00		0.95	0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1723		1715	1775	1615	1805	3535		1805	3574	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1023	18	18	24	12	54	14	1986	15	56	1810	776
RTOR Reduction (vph)	0	13	0	0	0	51	0	1	0	0	0	0
Lane Group Flow (vph)	1023	23	0	18	18	3	14	2000	0	56	1810	776
Heavy Vehicles (%)	2%	0%	4%	0%	0%	0%	0%	2%	3%	0%	1%	2%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA		Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6						Free
Actuated Green, G (s)	42.7	42.7		7.0	7.0	7.0	3.1	67.3		6.3	71.0	141.2
Effective Green, g (s)	42.7	42.7		7.0	7.0	7.0	3.1	67.3		6.3	71.0	141.2
Actuated g/C Ratio	0.30	0.30		0.05	0.05	0.05	0.02	0.48		0.04	0.50	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)	1038	521		85	87	80	39	1684		80	1797	1583
v/s Ratio Prot	c0.30	0.01		0.01	0.01		0.01	c0.57		0.03	0.51	
v/s Ratio Perm						0.00						c0.49
v/c Ratio	0.99	0.04		0.21	0.21	0.03	0.36	1.19		0.70	1.01	0.49
Uniform Delay, d1	48.9	34.8		64.5	64.4	63.9	68.1	36.9		66.5	35.1	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	24.3	0.1		2.1	2.0	0.3	5.6	90.9		23.4	23.0	1.1
Delay (s)	73.3	34.9		66.6	66.5	64.2	73.6	127.8		90.0	58.1	1.1
Level of Service	E	C		E	E	E	E	F		F	E	A
Approach Delay (s)		72.0			65.1			127.4			42.0	
Approach LOS		E			E			F			D	

Intersection Summary			
HCM 2000 Control Delay	77.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	141.2	Sum of lost time (s)	17.9
Intersection Capacity Utilization	99.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	183	10	20	40	10	30	38	605	18	11	455	89
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.99	0.99		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1887	1900	1900	1800	1863	1881	1846	1900	1827	1851	1900
Adj Flow Rate, veh/h	197	11	22	43	11	32	41	651	19	12	489	96
Adj No. of Lanes	1	1	0	0	1	1	1	2	0	1	2	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	0	0	0	0	2	1	3	3	4	3	3
Cap, veh/h	610	145	290	526	105	407	540	1447	42	502	1218	238
Arrive On Green	0.26	0.26	0.26	0.26	0.26	0.26	0.42	0.42	0.42	0.42	0.42	0.42
Sat Flow, veh/h	1347	558	1117	1016	403	1569	832	3480	102	747	2929	572
Grp Volume(v), veh/h	197	0	33	54	0	32	41	328	342	12	292	293
Grp Sat Flow(s),veh/h/ln	1347	0	1675	1419	0	1569	832	1754	1827	747	1758	1743
Q Serve(g_s), s	3.2	0.0	0.4	0.1	0.0	0.4	0.9	3.3	3.3	0.3	2.9	2.9
Cycle Q Clear(g_c), s	3.8	0.0	0.4	0.6	0.0	0.4	3.8	3.3	3.3	3.6	2.9	2.9
Prop In Lane	1.00		0.67	0.80		1.00	1.00		0.06	1.00		0.33
Lane Grp Cap(c), veh/h	610	0	435	631	0	407	540	729	760	502	731	725
V/C Ratio(X)	0.32	0.00	0.08	0.09	0.00	0.08	0.08	0.45	0.45	0.02	0.40	0.40
Avail Cap(c_a), veh/h	1353	0	1359	1396	0	1273	768	1210	1260	707	1213	1202
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	8.4	0.0	6.9	7.0	0.0	6.9	6.4	5.2	5.2	6.5	5.0	5.1
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	0.0	0.2	0.3	0.0	0.2	0.2	1.6	1.6	0.1	1.4	1.4
LnGrp Delay(d),s/veh	8.5	0.0	6.9	7.0	0.0	6.9	6.4	5.3	5.3	6.5	5.2	5.2
LnGrp LOS	A		A	A		A	A	A	A	A	A	A
Approach Vol, veh/h		230			86			711			597	
Approach Delay, s/veh		8.3			7.0			5.4			5.2	
Approach LOS		A			A			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		10.4		14.2		10.4		14.2
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		20.0		17.0		20.0		17.0
Max Q Clear Time (g_c+I1), s		5.8		5.6		2.6		5.8
Green Ext Time (p_c), s		0.6		4.2		0.6		4.1

Intersection Summary	
HCM 2010 Ctrl Delay	5.8
HCM 2010 LOS	A

HCM Signalized Intersection Capacity Analysis
8: SR 1 & Carpenter St

Existing + Proj Alt 1 AM-Miti.syn
3/14/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	402	5	17	18	14	49	19	1230	10	32	1568	702
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9	4.9	4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1681		1665	1782	1572	1736	3539	1395	1770	3438	1538
Flt Permitted	0.95	1.00		0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1681		1665	1782	1572	1736	3539	1395	1770	3438	1538
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	467	6	20	21	16	57	22	1430	12	37	1823	816
RTOR Reduction (vph)	0	17	0	0	0	54	0	0	5	0	0	0
Lane Group Flow (vph)	467	9	0	18	19	3	22	1430	7	37	1823	816
Confl. Peds. (#/hr)				1		1			1	1		
Heavy Vehicles (%)	2%	0%	0%	3%	0%	1%	4%	2%	13%	2%	5%	5%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6			8			Free
Actuated Green, G (s)	18.9	18.9		6.8	6.8	6.8	4.5	69.6	69.6	4.5	70.1	117.7
Effective Green, g (s)	18.9	18.9		6.8	6.8	6.8	4.5	69.6	69.6	4.5	70.1	117.7
Actuated g/C Ratio	0.16	0.16		0.06	0.06	0.06	0.04	0.59	0.59	0.04	0.60	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9	4.9	4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0	5.0	3.0	5.0	
Lane Grp Cap (vph)	551	269		96	102	90	66	2092	824	67	2047	1538
v/s Ratio Prot	c0.14	0.01		0.01	0.01		0.01	0.40		0.02	c0.53	
v/s Ratio Perm						0.00			0.01			c0.53
v/c Ratio	0.85	0.03		0.19	0.19	0.04	0.33	0.68	0.01	0.55	0.89	0.53
Uniform Delay, d1	48.0	41.7		52.8	52.8	52.4	55.1	16.5	9.9	55.6	20.5	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	12.4	0.1		1.6	1.5	0.3	3.0	1.2	0.0	9.5	5.7	1.3
Delay (s)	60.4	41.8		54.5	54.3	52.6	58.1	17.7	9.9	65.1	26.2	1.3
Level of Service	E	D		D	D	D	E	B	A	E	C	A
Approach Delay (s)		59.4			53.3			18.2			19.1	
Approach LOS		E			D			B			B	

Intersection Summary				
HCM 2000 Control Delay	23.7	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.89			
Actuated Cycle Length (s)	117.7	Sum of lost time (s)	17.9	
Intersection Capacity Utilization	69.4%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
8: SR 1 & Carpenter St

Existing + Proj Alt 1 PM-Miti.syn
3/14/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	982	17	17	23	12	52	13	1621	14	54	1472	745
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9	4.9	4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1723		1715	1775	1615	1805	3539	1568	1805	3574	1583
Flt Permitted	0.95	1.00		0.95	0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1723		1715	1775	1615	1805	3539	1568	1805	3574	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1023	18	18	24	12	54	14	1689	15	56	1533	776
RTOR Reduction (vph)	0	13	0	0	0	51	0	0	8	0	0	0
Lane Group Flow (vph)	1023	23	0	18	18	3	14	1689	7	56	1533	776
Heavy Vehicles (%)	2%	0%	4%	0%	0%	0%	0%	2%	3%	0%	1%	2%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6			8			Free
Actuated Green, G (s)	42.3	42.3		7.0	7.0	7.0	3.1	67.8	67.8	6.2	71.4	141.2
Effective Green, g (s)	42.3	42.3		7.0	7.0	7.0	3.1	67.8	67.8	6.2	71.4	141.2
Actuated g/C Ratio	0.30	0.30		0.05	0.05	0.05	0.02	0.48	0.48	0.04	0.51	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9	4.9	4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0	5.0	3.0	5.0	
Lane Grp Cap (vph)	1028	516		85	87	80	39	1699	752	79	1807	1583
v/s Ratio Prot	c0.30	0.01		0.01	0.01		0.01	c0.48		0.03	0.43	
v/s Ratio Perm						0.00			0.00			c0.49
v/c Ratio	1.00	0.05		0.21	0.21	0.03	0.36	0.99	0.01	0.71	0.85	0.49
Uniform Delay, d1	49.3	35.1		64.5	64.4	63.9	68.1	36.5	19.2	66.6	30.2	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	26.8	0.1		2.1	2.0	0.3	5.6	20.4	0.0	25.1	4.3	1.1
Delay (s)	76.1	35.2		66.6	66.5	64.2	73.6	56.9	19.2	91.7	34.6	1.1
Level of Service	E	D		E	E	E	E	E	B	F	C	A
Approach Delay (s)		74.7			65.1			56.7			24.9	
Approach LOS		E			E			E			C	

Intersection Summary				
HCM 2000 Control Delay	46.1	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.97			
Actuated Cycle Length (s)	141.2	Sum of lost time (s)	17.9	
Intersection Capacity Utilization	90.9%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
8: SR 1 & Carpenter St

Back + Proj Alt 1 AM-Miti.syn
3/14/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	402	5	17	18	14	49	19	1291	10	32	1619	702
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9	4.9	4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1681		1665	1782	1572	1736	3539	1395	1770	3438	1538
Flt Permitted	0.95	1.00		0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1681		1665	1782	1572	1736	3539	1395	1770	3438	1538
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	467	6	20	21	16	57	22	1501	12	37	1883	816
RTOR Reduction (vph)	0	17	0	0	0	54	0	0	5	0	0	0
Lane Group Flow (vph)	467	9	0	18	19	3	22	1501	7	37	1883	816
Confl. Peds. (#/hr)				1		1			1	1		
Heavy Vehicles (%)	2%	0%	0%	3%	0%	1%	4%	2%	13%	2%	5%	5%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6			8			Free
Actuated Green, G (s)	18.4	18.4		6.9	6.9	6.9	4.6	70.6	70.6	4.5	71.0	118.3
Effective Green, g (s)	18.4	18.4		6.9	6.9	6.9	4.6	70.6	70.6	4.5	71.0	118.3
Actuated g/C Ratio	0.16	0.16		0.06	0.06	0.06	0.04	0.60	0.60	0.04	0.60	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9	4.9	4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0	5.0	3.0	5.0	
Lane Grp Cap (vph)	533	261		97	103	91	67	2112	832	67	2063	1538
v/s Ratio Prot	c0.14	0.01		0.01	0.01		0.01	0.42		0.02	c0.55	
v/s Ratio Perm						0.00			0.01			c0.53
v/c Ratio	0.88	0.03		0.19	0.18	0.04	0.33	0.71	0.01	0.55	0.91	0.53
Uniform Delay, d1	48.8	42.4		53.0	53.0	52.6	55.3	16.7	9.7	55.9	20.9	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	15.7	0.1		1.6	1.5	0.3	2.9	1.4	0.0	9.5	7.0	1.3
Delay (s)	64.6	42.5		54.6	54.5	52.8	58.2	18.1	9.7	65.4	28.0	1.3
Level of Service	E	D		D	D	D	E	B	A	E	C	A
Approach Delay (s)		63.4			53.5			18.6			20.5	
Approach LOS		E			D			B			C	

Intersection Summary				
HCM 2000 Control Delay	24.9	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.91			
Actuated Cycle Length (s)	118.3	Sum of lost time (s)	17.9	
Intersection Capacity Utilization	70.8%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
8: SR 1 & Carpenter St

Back + Proj Alt 1 PM-Miti.syn
3/14/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	982	17	17	23	12	52	13	1689	14	54	1548	745
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9	4.9	4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1723		1715	1775	1615	1805	3539	1568	1805	3574	1583
Flt Permitted	0.95	1.00		0.95	0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1723		1715	1775	1615	1805	3539	1568	1805	3574	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1023	18	18	24	12	54	14	1759	15	56	1612	776
RTOR Reduction (vph)	0	13	0	0	0	51	0	0	8	0	0	0
Lane Group Flow (vph)	1023	23	0	18	18	3	14	1759	7	56	1612	776
Heavy Vehicles (%)	2%	0%	4%	0%	0%	0%	0%	2%	3%	0%	1%	2%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6			8			Free
Actuated Green, G (s)	41.3	41.3		7.0	7.0	7.0	3.1	68.8	68.8	6.2	72.4	141.2
Effective Green, g (s)	41.3	41.3		7.0	7.0	7.0	3.1	68.8	68.8	6.2	72.4	141.2
Actuated g/C Ratio	0.29	0.29		0.05	0.05	0.05	0.02	0.49	0.49	0.04	0.51	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9	4.9	4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0	5.0	3.0	5.0	
Lane Grp Cap (vph)	1004	503		85	87	80	39	1724	764	79	1832	1583
v/s Ratio Prot	c0.30	0.01		0.01	0.01		0.01	c0.50		0.03	0.45	
v/s Ratio Perm						0.00			0.00			c0.49
v/c Ratio	1.02	0.05		0.21	0.21	0.03	0.36	1.02	0.01	0.71	0.88	0.49
Uniform Delay, d1	49.9	35.8		64.5	64.4	63.9	68.1	36.2	18.6	66.6	30.5	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	33.2	0.1		2.1	2.0	0.3	5.6	26.9	0.0	25.1	5.6	1.1
Delay (s)	83.2	35.9		66.6	66.5	64.2	73.6	63.1	18.7	91.7	36.2	1.1
Level of Service	F	D		E	E	E	E	E	B	F	D	A
Approach Delay (s)		81.6			65.1			62.8			26.3	
Approach LOS		F			E			E			C	

Intersection Summary				
HCM 2000 Control Delay	50.0	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	1.00			
Actuated Cycle Length (s)	141.2	Sum of lost time (s)	17.9	
Intersection Capacity Utilization	92.8%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	0	855	539	61	1140	835
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9	4.0
Lane Util. Factor		0.88	0.95		0.97	1.00
Frt		0.85	0.98		1.00	1.00
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		2760	3468		3335	1759
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		2760	3468		3335	1759
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	929	586	66	1239	908
RTOR Reduction (vph)	0	185	9	0	0	0
Lane Group Flow (vph)	0	744	643	0	1239	908
Heavy Vehicles (%)	0%	3%	2%	7%	5%	8%
Turn Type		Over	NA		Prot	NA
Protected Phases		3	2		3	Free
Permitted Phases						
Actuated Green, G (s)		25.2	15.8		25.2	50.8
Effective Green, g (s)		25.2	15.8		25.2	50.8
Actuated g/C Ratio		0.50	0.31		0.50	1.00
Clearance Time (s)		4.9	4.9		4.9	
Vehicle Extension (s)		4.5	3.5		4.5	
Lane Grp Cap (vph)		1369	1078		1654	1759
v/s Ratio Prot		0.27	0.19		c0.37	0.52
v/s Ratio Perm						
v/c Ratio		0.54	0.60		0.75	0.52
Uniform Delay, d1		8.8	14.8		10.3	0.0
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		0.7	0.9		2.2	1.1
Delay (s)		9.5	15.8		12.4	1.1
Level of Service		A	B		B	A
Approach Delay (s)	9.5		15.8			7.6
Approach LOS	A		B			A

Intersection Summary			
HCM 2000 Control Delay	9.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	50.8	Sum of lost time (s)	9.8
Intersection Capacity Utilization	57.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	133	229	36	140	183	173	23	294	85	326	468	41
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1842	1900	1863	1810	1827	1759	1835	1900	1827	1827	1759
Adj Flow Rate, veh/h	145	249	39	152	199	188	25	320	92	354	509	45
Adj No. of Lanes	1	2	0	1	1	2	1	2	0	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	3	3	2	5	4	8	4	4	4	4	8
Cap, veh/h	209	644	100	211	386	576	76	700	198	486	657	534
Arrive On Green	0.12	0.21	0.21	0.12	0.21	0.21	0.05	0.26	0.26	0.14	0.36	0.36
Sat Flow, veh/h	1774	3038	470	1774	1810	2701	1675	2681	758	3375	1827	1485
Grp Volume(v), veh/h	145	142	146	152	199	188	25	206	206	354	509	45
Grp Sat Flow(s),veh/h/ln	1774	1750	1758	1774	1810	1351	1675	1743	1696	1688	1827	1485
Q Serve(g_s), s	4.9	4.3	4.5	5.2	6.1	3.7	0.9	6.2	6.4	6.3	15.4	1.2
Cycle Q Clear(g_c), s	4.9	4.3	4.5	5.2	6.1	3.7	0.9	6.2	6.4	6.3	15.4	1.2
Prop In Lane	1.00		0.27	1.00		1.00	1.00		0.45	1.00		1.00
Lane Grp Cap(c), veh/h	209	371	373	211	386	576	76	455	443	486	657	534
V/C Ratio(X)	0.69	0.38	0.39	0.72	0.52	0.33	0.33	0.45	0.47	0.73	0.77	0.08
Avail Cap(c_a), veh/h	264	782	786	264	809	1207	215	726	706	557	828	673
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.5	21.1	21.1	26.5	21.7	20.8	28.9	19.3	19.4	25.6	17.7	13.2
Incr Delay (d2), s/veh	5.5	0.8	0.8	7.0	1.3	0.4	2.5	0.9	0.9	4.1	3.9	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	2.2	2.2	2.9	3.2	1.4	0.5	3.1	3.1	3.2	8.5	0.5
LnGrp Delay(d),s/veh	32.0	21.9	21.9	33.5	23.0	21.2	31.4	20.2	20.3	29.7	21.6	13.3
LnGrp LOS	C	C	C	C	C	C	C	C	C	C	C	B
Approach Vol, veh/h		433			539			437			908	
Approach Delay, s/veh		25.3			25.3			20.9			24.4	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.1	17.4	6.5	27.4	11.1	17.5	12.7	21.2
Change Period (Y+Rc), s	3.7	* 4.2	3.7	4.9	3.7	* 4.2	3.7	4.9
Max Green Setting (Gmax), s	9.3	* 28	8.0	28.3	9.3	* 28	10.3	26.0
Max Q Clear Time (g_c+I1), s	7.2	6.5	2.9	17.4	6.9	8.1	8.3	8.4
Green Ext Time (p_c), s	0.1	4.6	0.0	4.7	0.1	4.5	0.3	6.1

Intersection Summary	
HCM 2010 Ctrl Delay	24.1
HCM 2010 LOS	C

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM Signalized Intersection Capacity Analysis
8: SR 1 & Carpenter St

Cum + Proj Alt 1 AM-Miti.syn
3/14/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	402	5	17	18	14	49	19	1410	10	32	1774	702
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9	4.9	4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1681		1665	1782	1572	1736	3539	1395	1770	3438	1538
Flt Permitted	0.95	1.00		0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1681		1665	1782	1572	1736	3539	1395	1770	3438	1538
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	467	6	20	21	16	57	22	1640	12	37	2063	816
RTOR Reduction (vph)	0	17	0	0	0	54	0	0	5	0	0	0
Lane Group Flow (vph)	467	9	0	18	19	3	22	1640	7	37	2063	816
Confl. Peds. (#/hr)				1		1			1	1		
Heavy Vehicles (%)	2%	0%	0%	3%	0%	1%	4%	2%	13%	2%	5%	5%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6			8			Free
Actuated Green, G (s)	17.2	17.2		6.9	6.9	6.9	4.6	71.7	71.7	4.5	72.1	118.2
Effective Green, g (s)	17.2	17.2		6.9	6.9	6.9	4.6	71.7	71.7	4.5	72.1	118.2
Actuated g/C Ratio	0.15	0.15		0.06	0.06	0.06	0.04	0.61	0.61	0.04	0.61	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9	4.9	4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0	5.0	3.0	5.0	
Lane Grp Cap (vph)	499	244		97	104	91	67	2146	846	67	2097	1538
v/s Ratio Prot	c0.14	0.01		0.01	0.01		0.01	0.46		0.02	c0.60	
v/s Ratio Perm						0.00			0.01			c0.53
v/c Ratio	0.94	0.04		0.19	0.18	0.04	0.33	0.76	0.01	0.55	0.98	0.53
Uniform Delay, d1	50.0	43.4		53.0	53.0	52.5	55.3	17.1	9.2	55.9	22.5	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	25.6	0.1		1.6	1.5	0.3	2.9	2.0	0.0	9.5	16.0	1.3
Delay (s)	75.5	43.5		54.6	54.4	52.8	58.2	19.0	9.2	65.4	38.5	1.3
Level of Service	E	D		D	D	D	E	B	A	E	D	A
Approach Delay (s)		73.8			53.5			19.5			28.4	
Approach LOS		E			D			B			C	

Intersection Summary				
HCM 2000 Control Delay	30.3	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.97			
Actuated Cycle Length (s)	118.2	Sum of lost time (s)	17.9	
Intersection Capacity Utilization	75.1%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
1: SR 1 & Carmel Valley Rd

Cum + Proj Alt 1 PM-Miti.syn
3/14/2016

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	0	968	975	105	993	771
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9	4.0
Lane Util. Factor		0.88	0.95		0.97	1.00
Frt		0.85	0.99		1.00	1.00
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		2814	3481		3467	1881
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		2814	3481		3467	1881
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	1030	1037	112	1056	820
RTOR Reduction (vph)	0	96	5	0	0	0
Lane Group Flow (vph)	0	934	1144	0	1056	820
Heavy Vehicles (%)	0%	1%	2%	4%	1%	1%
Turn Type		Over	NA		Prot	NA
Protected Phases		3	2		3	Free
Permitted Phases						
Actuated Green, G (s)		20.3	26.8		20.3	56.9
Effective Green, g (s)		20.3	26.8		20.3	56.9
Actuated g/C Ratio		0.36	0.47		0.36	1.00
Clearance Time (s)		4.9	4.9		4.9	
Vehicle Extension (s)		4.5	3.5		4.5	
Lane Grp Cap (vph)		1003	1639		1236	1881
v/s Ratio Prot		c0.33	c0.33		0.30	0.44
v/s Ratio Perm						
v/c Ratio		0.93	0.70		0.85	0.44
Uniform Delay, d1		17.6	11.9		16.9	0.0
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		15.0	1.4		6.4	0.7
Delay (s)		32.6	13.2		23.3	0.7
Level of Service		C	B		C	A
Approach Delay (s)	32.6		13.2			13.4
Approach LOS	C		B			B

Intersection Summary			
HCM 2000 Control Delay	18.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	56.9	Sum of lost time (s)	9.8
Intersection Capacity Utilization	72.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	143	367	83	190	418	356	162	581	164	330	397	44
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1878	1900	1881	1881	1863	1881	1849	1900	1881	1881	1900
Adj Flow Rate, veh/h	146	374	85	194	427	363	165	593	167	337	405	45
Adj No. of Lanes	1	2	0	1	1	2	1	2	0	2	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	1	1	1	1	2	1	3	3	1	1	0
Cap, veh/h	169	893	201	211	623	916	199	752	211	370	514	437
Arrive On Green	0.10	0.31	0.31	0.12	0.33	0.33	0.11	0.28	0.28	0.11	0.27	0.27
Sat Flow, veh/h	1774	2896	651	1792	1881	2766	1792	2706	760	3476	1881	1600
Grp Volume(v), veh/h	146	229	230	194	427	363	165	384	376	337	405	45
Grp Sat Flow(s),veh/h/ln	1774	1784	1763	1792	1881	1383	1792	1756	1710	1738	1881	1600
Q Serve(g_s), s	7.1	8.9	9.1	9.3	17.1	8.8	7.9	17.7	17.7	8.4	17.4	1.8
Cycle Q Clear(g_c), s	7.1	8.9	9.1	9.3	17.1	8.8	7.9	17.7	17.7	8.4	17.4	1.8
Prop In Lane	1.00		0.37	1.00		1.00	1.00		0.44	1.00		1.00
Lane Grp Cap(c), veh/h	169	550	543	211	623	916	199	488	475	370	514	437
V/C Ratio(X)	0.87	0.42	0.42	0.92	0.69	0.40	0.83	0.79	0.79	0.91	0.79	0.10
Avail Cap(c_a), veh/h	169	550	543	211	623	916	211	543	529	370	561	477
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	38.9	23.9	24.0	38.1	25.2	22.5	38.0	29.1	29.1	38.6	29.4	23.7
Incr Delay (d2), s/veh	34.4	0.6	0.6	39.7	6.0	1.3	22.2	7.2	7.5	25.7	7.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.1	4.5	4.5	7.0	9.9	3.5	5.1	9.5	9.3	5.3	10.0	0.8
LnGrp Delay(d),s/veh	73.4	24.6	24.6	77.8	31.3	23.7	60.1	36.3	36.7	64.3	36.5	23.8
LnGrp LOS	E	C	C	E	C	C	E	D	D	E	D	C
Approach Vol, veh/h		605			984			925			787	
Approach Delay, s/veh		36.4			37.7			40.7			47.7	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.0	31.1	13.4	28.8	12.0	33.1	13.0	29.2
Change Period (Y+Rc), s	3.7	* 4.2	3.7	4.9	3.7	* 4.2	3.7	4.9
Max Green Setting (Gmax), s	10.3	* 27	10.3	26.0	8.3	* 29	9.3	27.0
Max Q Clear Time (g_c+I1), s	11.3	11.1	9.9	19.4	9.1	19.1	10.4	19.7
Green Ext Time (p_c), s	0.0	7.8	0.0	4.0	0.0	5.7	0.0	4.3

Intersection Summary	
HCM 2010 Ctrl Delay	40.7
HCM 2010 LOS	D

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	982	17	17	23	12	52	13	1907	14	54	1738	745
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9	4.9	4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1723		1715	1775	1615	1805	3539	1568	1805	3574	1583
Flt Permitted	0.95	1.00		0.95	0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1723		1715	1775	1615	1805	3539	1568	1805	3574	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1023	18	18	24	12	54	14	1986	15	56	1810	776
RTOR Reduction (vph)	0	13	0	0	0	51	0	0	7	0	0	0
Lane Group Flow (vph)	1023	23	0	18	18	3	14	1986	8	56	1810	776
Heavy Vehicles (%)	2%	0%	4%	0%	0%	0%	0%	2%	3%	0%	1%	2%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6			8			Free
Actuated Green, G (s)	39.2	39.2		7.0	7.0	7.0	3.1	70.8	70.8	6.2	74.4	141.1
Effective Green, g (s)	39.2	39.2		7.0	7.0	7.0	3.1	70.8	70.8	6.2	74.4	141.1
Actuated g/C Ratio	0.28	0.28		0.05	0.05	0.05	0.02	0.50	0.50	0.04	0.53	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9	4.9	4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0	5.0	3.0	5.0	
Lane Grp Cap (vph)	953	478		85	88	80	39	1775	786	79	1884	1583
v/s Ratio Prot	c0.30	0.01		0.01	0.01		0.01	c0.56		0.03	0.51	
v/s Ratio Perm						0.00			0.00			c0.49
v/c Ratio	1.07	0.05		0.21	0.20	0.03	0.36	1.12	0.01	0.71	0.96	0.49
Uniform Delay, d1	50.9	37.3		64.4	64.4	63.8	68.0	35.1	17.6	66.6	32.0	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	51.0	0.1		2.1	2.0	0.3	5.6	61.8	0.0	25.1	12.9	1.1
Delay (s)	101.9	37.4		66.5	66.4	64.1	73.6	96.9	17.6	91.7	44.9	1.1
Level of Service	F	D		E	E	E	E	F	B	F	D	A
Approach Delay (s)		99.7			65.1			96.2			33.0	
Approach LOS		F			E			F			C	

Intersection Summary			
HCM 2000 Control Delay	67.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	141.1	Sum of lost time (s)	17.9
Intersection Capacity Utilization	98.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	0	731	458	54	1059	694
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9	4.9	4.9	4.0
Lane Util. Factor		0.88	1.00	1.00	0.97	1.00
Frt		0.85	1.00	0.85	1.00	1.00
Flt Protected		1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		2760	1863	1509	3335	1759
Flt Permitted		1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		2760	1863	1509	3335	1759
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	795	498	59	1151	754
RTOR Reduction (vph)	0	259	0	12	0	0
Lane Group Flow (vph)	0	536	498	47	1151	754
Heavy Vehicles (%)	0%	3%	2%	7%	5%	8%
Turn Type		Over	NA	Perm	Prot	NA
Protected Phases		3	2		3	Free
Permitted Phases				2		
Actuated Green, G (s)		25.1	20.6	20.6	25.1	55.5
Effective Green, g (s)		25.1	20.6	20.6	25.1	55.5
Actuated g/C Ratio		0.45	0.37	0.37	0.45	1.00
Clearance Time (s)		4.9	4.9	4.9	4.9	
Vehicle Extension (s)		4.5	3.5	3.5	4.5	
Lane Grp Cap (vph)		1248	691	560	1508	1759
v/s Ratio Prot		0.19	c0.27		c0.35	0.43
v/s Ratio Perm				0.03		
v/c Ratio		0.43	0.72	0.08	0.76	0.43
Uniform Delay, d1		10.3	15.0	11.3	12.7	0.0
Progression Factor		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.4	3.8	0.1	2.6	0.8
Delay (s)		10.7	18.8	11.4	15.4	0.8
Level of Service		B	B	B	B	A
Approach Delay (s)	10.7		18.0			9.6
Approach LOS	B		B			A

Intersection Summary			
HCM 2000 Control Delay	11.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	55.5	Sum of lost time (s)	9.8
Intersection Capacity Utilization	62.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	27	685	401	395	612	5	86	5	257	10	17	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		0.95	0.95	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00	1.00		1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.98	1.00
Satd. Flow (prot)	1736	3374	1563	3467	3501		1618	1641	1524		1681	1560
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.98	1.00
Satd. Flow (perm)	1736	3374	1563	3467	3501		1618	1641	1524		1681	1560
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	31	778	456	449	695	6	98	6	292	11	19	38
RTOR Reduction (vph)	0	0	291	0	1	0	0	0	243	0	0	37
Lane Group Flow (vph)	31	778	165	449	700	0	52	52	49	0	30	1
Confl. Peds. (#/hr)	2		1			1	1			1		2
Heavy Vehicles (%)	4%	7%	2%	1%	3%	0%	6%	0%	6%	30%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Over	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	7	7	
Permitted Phases			2									7
Actuated Green, G (s)	1.8	20.2	20.2	9.3	27.8		4.3	4.3	9.3		1.5	1.5
Effective Green, g (s)	1.8	20.2	20.2	9.3	27.8		4.3	4.3	9.3		1.5	1.5
Actuated g/C Ratio	0.03	0.36	0.36	0.17	0.50		0.08	0.08	0.17		0.03	0.03
Clearance Time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Vehicle Extension (s)	1.0	1.3	1.3	1.0	1.3		1.0	1.0	1.0		1.0	1.0
Lane Grp Cap (vph)	56	1223	566	578	1747		124	126	254		45	42
v/s Ratio Prot	0.02	c0.23		c0.13	0.20		c0.03	0.03	0.03		c0.02	
v/s Ratio Perm			0.11									0.00
v/c Ratio	0.55	0.64	0.29	0.78	0.40		0.42	0.41	0.19		0.67	0.02
Uniform Delay, d1	26.6	14.7	12.7	22.2	8.7		24.5	24.5	20.0		26.9	26.4
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	6.6	0.8	0.1	5.9	0.1		0.8	0.8	0.1		25.2	0.1
Delay (s)	33.1	15.5	12.8	28.1	8.8		25.3	25.3	20.1		52.1	26.5
Level of Service	C	B	B	C	A		C	C	C		D	C
Approach Delay (s)		14.9			16.3			21.5			37.8	
Approach LOS		B			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	16.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	55.7	Sum of lost time (s)	20.4
Intersection Capacity Utilization	52.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	133	221	36	124	177	151	23	228	81	298	355	41
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1842	1900	1863	1810	1827	1759	1827	1863	1827	1820	1900
Adj Flow Rate, veh/h	145	240	39	135	192	164	25	248	88	324	386	45
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	2	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	3	3	2	5	4	8	4	2	4	4	4
Cap, veh/h	215	640	103	212	379	322	76	447	385	504	557	65
Arrive On Green	0.12	0.21	0.21	0.12	0.21	0.21	0.05	0.24	0.24	0.15	0.35	0.35
Sat Flow, veh/h	1774	3021	484	1774	1810	1534	1675	1827	1574	3375	1599	186
Grp Volume(v), veh/h	145	138	141	135	192	164	25	248	88	324	0	431
Grp Sat Flow(s),veh/h/ln	1774	1750	1755	1774	1810	1534	1675	1827	1574	1688	0	1785
Q Serve(g_s), s	4.7	4.0	4.1	4.4	5.6	5.7	0.9	7.1	2.7	5.4	0.0	12.4
Cycle Q Clear(g_c), s	4.7	4.0	4.1	4.4	5.6	5.7	0.9	7.1	2.7	5.4	0.0	12.4
Prop In Lane	1.00		0.28	1.00		1.00	1.00		1.00	1.00		0.10
Lane Grp Cap(c), veh/h	215	371	372	212	379	322	76	447	385	504	0	622
V/C Ratio(X)	0.67	0.37	0.38	0.64	0.51	0.51	0.33	0.55	0.23	0.64	0.00	0.69
Avail Cap(c_a), veh/h	275	814	816	275	841	713	223	791	682	579	0	842
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	25.2	20.2	20.3	25.2	21.0	21.0	27.8	19.8	18.1	24.0	0.0	16.8
Incr Delay (d2), s/veh	4.3	0.7	0.8	3.2	1.3	1.5	2.5	1.3	0.4	2.0	0.0	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	2.0	2.1	2.3	3.0	2.5	0.5	3.7	1.2	2.7	0.0	6.4
LnGrp Delay(d),s/veh	29.6	21.0	21.0	28.4	22.2	22.5	30.2	21.1	18.5	26.0	0.0	18.6
LnGrp LOS	C	C	C	C	C	C	C	C	B	C		B
Approach Vol, veh/h		424			491			361			755	
Approach Delay, s/veh		23.9			24.0			21.1			21.8	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.9	16.9	6.4	25.8	11.0	16.8	12.7	19.6
Change Period (Y+Rc), s	3.7	* 4.2	3.7	4.9	3.7	* 4.2	3.7	4.9
Max Green Setting (Gmax), s	9.3	* 28	8.0	28.3	9.3	* 28	10.3	26.0
Max Q Clear Time (g_c+I1), s	6.4	6.1	2.9	14.4	6.7	7.7	7.4	9.1
Green Ext Time (p_c), s	0.1	4.3	0.0	4.2	0.1	4.2	0.3	4.6

Intersection Summary		
HCM 2010 Ctrl Delay		22.6
HCM 2010 LOS		C

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	53	388	83	86	263	0	140	0	69	0	0	0
Number	5	2	12	1	6	16	3	8	18			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1900	1860	1900	1810	1792	0	1810	1696	1900			
Adj Flow Rate, veh/h	58	426	91	95	289	0	154	0	76			
Adj No. of Lanes	1	2	0	1	2	0	2	1	0			
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91			
Percent Heavy Veh, %	0	2	2	5	6	0	5	0	5			
Cap, veh/h	80	1759	373	118	2148	0	317	0	137			
Arrive On Green	0.04	0.61	0.61	0.14	1.00	0.00	0.09	0.00	0.09			
Sat Flow, veh/h	1810	2901	615	1723	3495	0	3343	0	1442			
Grp Volume(v), veh/h	58	258	259	95	289	0	154	0	76			
Grp Sat Flow(s),veh/h/ln	1810	1767	1749	1723	1703	0	1672	0	1442			
Q Serve(g_s), s	1.6	3.4	3.4	2.7	0.0	0.0	2.2	0.0	2.5			
Cycle Q Clear(g_c), s	1.6	3.4	3.4	2.7	0.0	0.0	2.2	0.0	2.5			
Prop In Lane	1.00		0.35	1.00		0.00	1.00		1.00			
Lane Grp Cap(c), veh/h	80	1071	1061	118	2148	0	317	0	137			
V/C Ratio(X)	0.72	0.24	0.24	0.80	0.13	0.00	0.49	0.00	0.56			
Avail Cap(c_a), veh/h	199	1071	1061	224	2148	0	1070	0	461			
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.88	0.88	0.88	1.00	1.00	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	23.6	4.5	4.5	21.2	0.0	0.0	21.5	0.0	21.6			
Incr Delay (d2), s/veh	4.0	0.5	0.5	4.7	0.1	0.0	0.4	0.0	1.3			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.9	1.7	1.7	1.4	0.0	0.0	1.0	0.0	1.0			
LnGrp Delay(d),s/veh	27.6	5.0	5.0	26.0	0.1	0.0	21.9	0.0	22.9			
LnGrp LOS	C	A	A	C	A		C		C			
Approach Vol, veh/h		575			384			230				
Approach Delay, s/veh		7.3			6.5			22.2				
Approach LOS		A			A			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	6.9	34.3			5.7	35.5		8.7
Change Period (Y+Rc), s	3.5	4.0			3.5	4.0		4.0
Max Green Setting (Gmax), s	6.5	16.0			5.5	17.0		16.0
Max Q Clear Time (g_c+I1), s	4.7	5.4			3.6	2.0		4.5
Green Ext Time (p_c), s	0.0	2.8			0.0	3.3		0.4

Intersection Summary		
HCM 2010 Ctrl Delay		9.9
HCM 2010 LOS		A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	365	92	61	317	1	32	0	38	0	0	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	0.99		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1820	1900	1845	1845	1900	1900	1638	1712	1900	1900	1900
Adj Flow Rate, veh/h	0	440	111	73	382	1	39	0	46	0	0	0
Adj No. of Lanes	0	2	0	1	2	0	0	1	1	0	1	0
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	0	4	4	3	3	3	0	0	11	0	0	0
Cap, veh/h	0	1817	455	91	2814	7	212	0	80	0	105	0
Arrive On Green	0.00	0.22	0.22	0.05	0.78	0.78	0.06	0.00	0.06	0.00	0.00	0.00
Sat Flow, veh/h	0	2832	686	1757	3586	9	1228	0	1444	0	1900	0
Grp Volume(v), veh/h	0	276	275	73	187	196	39	0	46	0	0	0
Grp Sat Flow(s),veh/h/ln	0	1729	1698	1757	1753	1843	1228	0	1444	0	1900	0
Q Serve(g_s), s	0.0	6.6	6.7	2.1	1.3	1.3	1.5	0.0	1.6	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	6.6	6.7	2.1	1.3	1.3	1.5	0.0	1.6	0.0	0.0	0.0
Prop In Lane	0.00		0.40	1.00		0.01	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	0	1146	1125	91	1375	1446	212	0	80	0	105	0
V/C Ratio(X)	0.00	0.24	0.24	0.80	0.14	0.14	0.18	0.00	0.57	0.00	0.00	0.00
Avail Cap(c_a), veh/h	0	1146	1125	193	1375	1446	537	0	462	0	608	0
HCM Platoon Ratio	1.00	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.98	0.98	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	9.2	9.2	23.5	1.3	1.3	23.0	0.0	23.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.5	0.5	6.1	0.2	0.2	0.2	0.0	2.4	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.3	3.3	1.1	0.6	0.7	0.5	0.0	0.7	0.0	0.0	0.0
LnGrp Delay(d),s/veh	0.0	9.6	9.7	29.5	1.5	1.5	23.2	0.0	25.4	0.0	0.0	0.0
LnGrp LOS		A	A	C	A	A	C		C			
Approach Vol, veh/h		551			456			85			0	
Approach Delay, s/veh		9.7			6.0			24.4			0.0	
Approach LOS		A			A			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	6.1	37.1		6.8		43.2		6.8
Change Period (Y+Rc), s	3.5	4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s	5.5	17.0		16.0		26.0		16.0
Max Q Clear Time (g_c+I1), s	4.1	8.7		0.0		3.3		3.6
Green Ext Time (p_c), s	0.0	3.9		0.0		6.8		0.1

Intersection Summary		
HCM 2010 Ctrl Delay		9.3
HCM 2010 LOS		A

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	218	0	16	0	1	0	17	14	0	0	32	307
Conflicting Peds, #/hr	2	0	2	0	0	0	2	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	210	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	1	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	92	80	92	92	92	80	80	92	92	80	80
Heavy Vehicles, %	7	0	0	2	2	2	0	7	0	0	0	2
Mvmt Flow	272	0	20	0	1	0	21	18	0	0	40	384

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	3	0	0	2	0	0	25	550	2	14	550	5
Stage 1	-	-	-	-	-	-	2	547	-	3	3	-
Stage 2	-	-	-	-	-	-	23	3	-	11	547	-
Critical Hdwy	4.17	-	-	-	-	-	7.1	6.57	-	7.1	6.5	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.57	-	-	-	-
Follow-up Hdwy	2.263	-	-	-	-	-	3.5	4.063	-	3.5	4	3.318
Pot Cap-1 Maneuver	1587	-	-	-	-	-	991	436	-	1007	446	1078
Stage 1	-	-	-	-	-	-	-	-	-	1025	897	-
Stage 2	-	-	-	-	-	-	1000	883	-	-	-	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1584	-	-	-	-	-	571	360	-	-	368	1074
Mov Cap-2 Maneuver	-	-	-	-	-	-	371	1061	-	-	~ -783	-
Stage 1	-	-	-	-	-	-	-	-	-	847	896	-
Stage 2	-	-	-	-	-	-	613	882	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	7.2	0		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	371	-	1584	-	-	-	-	-	-	1074
HCM Lane V/C Ratio	0.057	-	0.172	-	-	-	-	-	-	0.357
HCM Control Delay (s)	15.3	-	7.7	-	-	0	-	-	-	10.2
HCM Lane LOS	C	-	A	-	-	A	-	-	-	B
HCM 95th %tile Q(veh)	0.2	-	0.6	-	-	-	-	-	-	1.6

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 2010 Signalized Intersection Summary
7: SR 1 & Ocean Ave

Existing + Proj Alt 2 AM.syn
3/14/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	213	40	113	134	38	50	136	992	37	16	1427	137
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.94	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1869	1900	1900	1842	1900	1827	1839	1900	1357	1827	1845
Adj Flow Rate, veh/h	210	94	130	128	81	57	156	1140	43	18	1640	0
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	3	0	0	0	9	9	4	3	3	40	4	3
Cap, veh/h	288	114	158	151	82	58	163	1827	69	37	1620	732
Arrive On Green	0.16	0.16	0.16	0.08	0.08	0.08	0.09	0.53	0.53	0.03	0.47	0.00
Sat Flow, veh/h	1757	697	965	1810	977	688	1740	3432	129	1293	3471	1568
Grp Volume(v), veh/h	210	0	224	128	0	138	156	580	603	18	1640	0
Grp Sat Flow(s),veh/h/ln	1757	0	1662	1810	0	1665	1740	1747	1814	1293	1736	1568
Q Serve(g_s), s	10.0	0.0	11.5	6.2	0.0	7.3	7.9	20.6	20.6	1.2	41.3	0.0
Cycle Q Clear(g_c), s	10.0	0.0	11.5	6.2	0.0	7.3	7.9	20.6	20.6	1.2	41.3	0.0
Prop In Lane	1.00		0.58	1.00		0.41	1.00		0.07	1.00		1.00
Lane Grp Cap(c), veh/h	288	0	272	151	0	139	163	930	965	37	1620	732
V/C Ratio(X)	0.73	0.00	0.82	0.85	0.00	0.99	0.96	0.62	0.62	0.49	1.01	0.00
Avail Cap(c_a), veh/h	318	0	300	151	0	139	163	930	965	107	1620	732
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	35.1	0.0	35.8	40.0	0.0	40.5	39.9	14.5	14.5	42.4	23.6	0.0
Incr Delay (d2), s/veh	7.9	0.0	16.0	34.4	0.0	73.5	57.3	1.7	1.6	9.9	25.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.5	0.0	6.5	4.5	0.0	6.2	6.4	10.3	10.6	0.5	25.3	0.0
LnGrp Delay(d),s/veh	43.1	0.0	51.7	74.3	0.0	114.0	97.2	16.2	16.1	52.3	49.0	0.0
LnGrp LOS	D		D	E		F	F	B	B	D	F	
Approach Vol, veh/h		434			266			1339			1658	
Approach Delay, s/veh		47.5			94.9			25.6			49.1	
Approach LOS		D			F			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		18.7	12.0	46.2		11.6	6.2	52.0
Change Period (Y+Rc), s		* 4.2	3.7	4.9		4.2	3.7	4.9
Max Green Setting (Gmax), s		* 16	8.3	41.3		7.4	7.3	42.3
Max Q Clear Time (g_c+I1), s		13.5	9.9	43.3		9.3	3.2	22.6
Green Ext Time (p_c), s		0.6	0.0	0.0		0.0	0.0	18.9

Intersection Summary	
HCM 2010 Ctrl Delay	43.7
HCM 2010 LOS	D

Notes

User approved volume balancing among the lanes for turning movement.

HCM Signalized Intersection Capacity Analysis
8: SR 1 & Carpenter St

Existing + Proj Alt 2 AM.syn
3/14/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	402	5	17	18	14	49	19	1230	10	32	1568	702
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.88		1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.99	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1681		1665	1782	1572	1736	3531		1770	3438	1538
Flt Permitted	0.95	1.00		0.95	0.99	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1681		1665	1782	1572	1736	3531		1770	3438	1538
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	467	6	20	21	16	57	22	1430	12	37	1823	816
RTOR Reduction (vph)	0	17	0	0	0	54	0	0	0	0	0	0
Lane Group Flow (vph)	467	9	0	18	19	3	22	1442	0	37	1823	816
Confl. Peds. (#/hr)				1		1			1	1		
Heavy Vehicles (%)	2%	0%	0%	3%	0%	1%	4%	2%	13%	2%	5%	5%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA		Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6						Free
Actuated Green, G (s)	18.9	18.9		6.8	6.8	6.8	4.5	69.6		4.5	70.1	117.7
Effective Green, g (s)	18.9	18.9		6.8	6.8	6.8	4.5	69.6		4.5	70.1	117.7
Actuated g/C Ratio	0.16	0.16		0.06	0.06	0.06	0.04	0.59		0.04	0.60	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)	551	269		96	102	90	66	2088		67	2047	1538
v/s Ratio Prot	c0.14	0.01		0.01	0.01		0.01	0.41		0.02	c0.53	
v/s Ratio Perm						0.00						c0.53
v/c Ratio	0.85	0.03		0.19	0.19	0.04	0.33	0.69		0.55	0.89	0.53
Uniform Delay, d1	48.0	41.7		52.8	52.8	52.4	55.1	16.6		55.6	20.5	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	12.4	0.1		1.6	1.5	0.3	3.0	1.3		9.5	5.7	1.3
Delay (s)	60.4	41.8		54.5	54.3	52.6	58.1	17.9		65.1	26.2	1.3
Level of Service	E	D		D	D	D	E	B		E	C	A
Approach Delay (s)		59.4			53.3			18.5			19.1	
Approach LOS		E			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	23.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	117.7	Sum of lost time (s)	17.9
Intersection Capacity Utilization	69.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Synchro 8 Report
\\Gil-data-vm\fileserver\2015\Jobs\358717 - Carmel Rio Subdivision\Synchro\3-xx-16 Draft Report Alt 2\Existing + Proj Alt 2 AM.syn

HCM 2010 Signalized Intersection Summary
9: Carmel Rancho Blvd & Shopping Center Dwy

Existing + Proj Alt 2 AM.syn
3/14/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	51	1	19	9	1	20	17	200	15	76	499	163
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		1.00	1.00		0.99	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1882	1900	1900	1785	1863	1881	1848	1900	1827	1854	1900
Adj Flow Rate, veh/h	66	1	25	12	1	26	22	260	19	99	648	212
Adj No. of Lanes	1	1	0	0	1	1	1	2	0	1	2	0
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Percent Heavy Veh, %	0	0	0	0	0	2	1	3	3	4	3	3
Cap, veh/h	485	7	177	463	15	180	563	1638	119	835	1286	420
Arrive On Green	0.11	0.11	0.11	0.11	0.11	0.11	0.49	0.49	0.49	0.49	0.49	0.49
Sat Flow, veh/h	1392	62	1545	1084	134	1574	645	3320	241	1072	2607	852
Grp Volume(v), veh/h	66	0	26	13	0	26	22	137	142	99	438	422
Grp Sat Flow(s),veh/h/ln	1392	0	1607	1218	0	1574	645	1756	1805	1072	1761	1698
Q Serve(g_s), s	0.9	0.0	0.3	0.1	0.0	0.3	0.5	0.9	0.9	1.1	3.4	3.4
Cycle Q Clear(g_c), s	1.3	0.0	0.3	0.4	0.0	0.3	3.9	0.9	0.9	2.0	3.4	3.4
Prop In Lane	1.00		0.96	0.92		1.00	1.00		0.13	1.00		0.50
Lane Grp Cap(c), veh/h	485	0	184	479	0	180	563	866	890	835	869	838
V/C Ratio(X)	0.14	0.00	0.14	0.03	0.00	0.14	0.04	0.16	0.16	0.12	0.50	0.50
Avail Cap(c_a), veh/h	1690	0	1575	1643	0	1542	782	1463	1503	1199	1467	1415
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	8.8	0.0	8.1	8.2	0.0	8.1	4.8	2.8	2.8	3.4	3.5	3.5
Incr Delay (d2), s/veh	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.1	0.1	0.0	0.1	0.1	0.4	0.4	0.3	1.6	1.6
LnGrp Delay(d),s/veh	8.8	0.0	8.3	8.2	0.0	8.3	4.8	2.9	2.9	3.4	3.7	3.7
LnGrp LOS	A		A	A		A	A	A	A	A	A	A
Approach Vol, veh/h		92			39			301			959	
Approach Delay, s/veh		8.7			8.2			3.0			3.6	
Approach LOS		A			A			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		6.3		14.1		6.3		14.1
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		20.0		17.0		20.0		17.0
Max Q Clear Time (g_c+I1), s		3.3		5.4		2.4		5.9
Green Ext Time (p_c), s		0.2		4.1		0.2		4.0

Intersection Summary	
HCM 2010 Ctrl Delay	4.0
HCM 2010 LOS	A

HCM Signalized Intersection Capacity Analysis
1: SR 1 & Carmel Valley Rd

Existing + Proj Alt 2 PM.syn
3/14/2016

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	0	853	777	88	847	617
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9	4.9	4.9	4.0
Lane Util. Factor		0.88	1.00	1.00	0.97	1.00
Frt		0.85	1.00	0.85	1.00	1.00
Flt Protected		1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		2814	1863	1553	3467	1881
Flt Permitted		1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		2814	1863	1553	3467	1881
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	907	827	94	901	656
RTOR Reduction (vph)	0	170	0	10	0	0
Lane Group Flow (vph)	0	737	827	84	901	656
Heavy Vehicles (%)	0%	1%	2%	4%	1%	1%
Turn Type		Over	NA	Perm	Prot	NA
Protected Phases		3	2		3	Free
Permitted Phases				2		
Actuated Green, G (s)		20.3	31.1	31.1	20.3	61.2
Effective Green, g (s)		20.3	31.1	31.1	20.3	61.2
Actuated g/C Ratio		0.33	0.51	0.51	0.33	1.00
Clearance Time (s)		4.9	4.9	4.9	4.9	
Vehicle Extension (s)		4.5	3.5	3.5	4.5	
Lane Grp Cap (vph)		933	946	789	1150	1881
v/s Ratio Prot		c0.26	c0.44		0.26	0.35
v/s Ratio Perm				0.05		
v/c Ratio		0.79	0.87	0.11	0.78	0.35
Uniform Delay, d1		18.5	13.3	7.8	18.5	0.0
Progression Factor		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		5.0	9.2	0.1	4.0	0.5
Delay (s)		23.5	22.6	7.9	22.4	0.5
Level of Service		C	C	A	C	A
Approach Delay (s)	23.5		21.1			13.2
Approach LOS	C		C			B

Intersection Summary			
HCM 2000 Control Delay	18.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	61.2	Sum of lost time (s)	9.8
Intersection Capacity Utilization	78.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: Carmel Rancho Blvd/Carmel Knolls Dr & Carmel Valley Rd

Existing + Proj Alt 2 PM.syn
3/14/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	711	193	301	558	4	277	17	510	4	23	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		0.95	0.95	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	1.00
Satd. Flow (prot)	1805	3539	1615	3467	3571		1715	1728	1599		1887	1553
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	1.00
Satd. Flow (perm)	1805	3539	1615	3467	3571		1715	1728	1599		1887	1553
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	33	756	205	320	594	4	295	18	543	4	24	19
RTOR Reduction (vph)	0	0	139	0	1	0	0	0	460	0	0	19
Lane Group Flow (vph)	33	756	66	320	597	0	156	157	83	0	28	0
Heavy Vehicles (%)	0%	2%	0%	1%	1%	0%	0%	0%	1%	0%	0%	4%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Over	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	7	7	
Permitted Phases			2									7
Actuated Green, G (s)	1.8	19.1	19.1	9.0	26.4		8.9	8.9	9.0		1.5	1.5
Effective Green, g (s)	1.8	19.1	19.1	9.0	26.4		8.9	8.9	9.0		1.5	1.5
Actuated g/C Ratio	0.03	0.32	0.32	0.15	0.45		0.15	0.15	0.15		0.03	0.03
Clearance Time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Vehicle Extension (s)	1.0	1.3	1.3	1.0	1.3		1.0	1.0	1.0		1.0	1.0
Lane Grp Cap (vph)	55	1147	523	529	1600		259	261	244		48	39
v/s Ratio Prot	0.02	c0.21		c0.09	0.17		c0.09	0.09	0.05		c0.01	
v/s Ratio Perm			0.04									0.00
v/c Ratio	0.60	0.66	0.13	0.60	0.37		0.60	0.60	0.34		0.58	0.01
Uniform Delay, d1	28.2	17.1	14.0	23.3	10.8		23.3	23.3	22.3		28.4	28.0
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	11.2	1.1	0.0	1.3	0.1		2.7	2.7	0.3		11.1	0.0
Delay (s)	39.4	18.2	14.1	24.6	10.8		26.0	26.0	22.6		39.5	28.0
Level of Service	D	B	B	C	B		C	C	C		D	C
Approach Delay (s)		18.0			15.6			23.9			34.9	
Approach LOS		B			B			C			C	

Intersection Summary				
HCM 2000 Control Delay	19.3	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.63			
Actuated Cycle Length (s)	58.9	Sum of lost time (s)	20.4	
Intersection Capacity Utilization	66.7%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM 2010 Signalized Intersection Summary
3: SR 1 & Rio Rd

Existing + Proj Alt 2 PM.syn
3/14/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	143	348	83	166	401	295	162	427	155	264	309	44
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1878	1900	1881	1881	1863	1881	1845	1863	1881	1884	1900
Adj Flow Rate, veh/h	146	355	85	169	409	301	165	436	158	269	315	45
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	2	1	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	1	1	1	1	2	1	3	2	1	1	1
Cap, veh/h	169	898	213	203	624	521	199	517	441	359	438	63
Arrive On Green	0.10	0.31	0.31	0.11	0.33	0.33	0.11	0.28	0.28	0.10	0.27	0.27
Sat Flow, veh/h	1774	2864	678	1792	1881	1571	1792	1845	1575	3476	1610	230
Grp Volume(v), veh/h	146	219	221	169	409	301	165	436	158	269	0	360
Grp Sat Flow(s),veh/h/ln	1774	1784	1758	1792	1881	1571	1792	1845	1575	1738	0	1840
Q Serve(g_s), s	7.1	8.4	8.6	8.0	16.2	13.8	7.9	19.4	7.0	6.6	0.0	15.4
Cycle Q Clear(g_c), s	7.1	8.4	8.6	8.0	16.2	13.8	7.9	19.4	7.0	6.6	0.0	15.4
Prop In Lane	1.00		0.39	1.00		1.00	1.00		1.00	1.00		0.13
Lane Grp Cap(c), veh/h	169	559	551	203	624	521	199	517	441	359	0	501
V/C Ratio(X)	0.86	0.39	0.40	0.83	0.66	0.58	0.83	0.84	0.36	0.75	0.00	0.72
Avail Cap(c_a), veh/h	169	559	551	212	624	521	212	572	488	371	0	549
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	38.8	23.4	23.5	37.8	24.8	24.0	37.9	29.5	25.1	38.0	0.0	28.7
Incr Delay (d2), s/veh	34.1	0.5	0.6	22.9	5.3	4.6	22.1	10.6	0.6	8.0	0.0	4.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.0	4.2	4.3	5.3	9.3	6.6	5.1	11.3	3.1	3.5	0.0	8.4
LnGrp Delay(d),s/veh	72.9	23.9	24.0	60.6	30.1	28.6	60.0	40.1	25.7	46.0	0.0	33.0
LnGrp LOS	E	C	C	E	C	C	E	D	C	D		C
Approach Vol, veh/h		586			879			759			629	
Approach Delay, s/veh		36.2			35.5			41.4			38.6	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.6	31.5	13.4	28.6	12.0	33.1	12.7	29.3
Change Period (Y+Rc), s	3.7	* 4.2	3.7	4.9	3.7	* 4.2	3.7	4.9
Max Green Setting (Gmax), s	10.3	* 27	10.3	26.0	8.3	* 29	9.3	27.0
Max Q Clear Time (g_c+I1), s	10.0	10.6	9.9	17.4	9.1	18.2	8.6	21.4
Green Ext Time (p_c), s	0.0	7.3	0.0	3.8	0.0	5.6	0.1	2.8

Intersection Summary	
HCM 2010 Ctrl Delay	37.9
HCM 2010 LOS	D

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	84	461	138	137	440	0	348	0	133	0	0	0
Number	5	2	12	1	6	16	3	8	18			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1900	1867	1900	1881	1881	0	1881	1863	1900			
Adj Flow Rate, veh/h	85	466	139	138	444	0	352	0	134			
Adj No. of Lanes	1	2	0	1	2	0	2	1	0			
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99			
Percent Heavy Veh, %	0	2	2	1	1	0	1	0	1			
Cap, veh/h	108	1401	415	173	1989	0	534	0	243			
Arrive On Green	0.06	0.52	0.52	0.19	1.00	0.00	0.15	0.00	0.15			
Sat Flow, veh/h	1810	2697	799	1792	3668	0	3476	0	1583			
Grp Volume(v), veh/h	85	305	300	138	444	0	352	0	134			
Grp Sat Flow(s),veh/h/ln	1810	1774	1722	1792	1787	0	1738	0	1583			
Q Serve(g_s), s	2.3	5.0	5.1	3.7	0.0	0.0	4.8	0.0	3.9			
Cycle Q Clear(g_c), s	2.3	5.0	5.1	3.7	0.0	0.0	4.8	0.0	3.9			
Prop In Lane	1.00		0.46	1.00		0.00	1.00		1.00			
Lane Grp Cap(c), veh/h	108	921	895	173	1989	0	534	0	243			
V/C Ratio(X)	0.78	0.33	0.33	0.80	0.22	0.00	0.66	0.00	0.55			
Avail Cap(c_a), veh/h	235	921	895	233	1989	0	1112	0	507			
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.87	0.87	0.87	0.99	0.99	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	23.2	7.0	7.0	19.7	0.0	0.0	19.9	0.0	19.6			
Incr Delay (d2), s/veh	4.0	0.8	0.9	9.1	0.3	0.0	0.5	0.0	0.7			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	1.3	2.6	2.5	2.2	0.1	0.0	2.3	0.0	1.8			
LnGrp Delay(d),s/veh	27.2	7.8	7.9	28.8	0.3	0.0	20.4	0.0	20.3			
LnGrp LOS	C	A	A	C	A		C		C			
Approach Vol, veh/h		690			582			486				
Approach Delay, s/veh		10.2			7.0			20.4				
Approach LOS		B			A			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	8.3	30.0			6.5	31.8		11.7
Change Period (Y+Rc), s	3.5	4.0			3.5	4.0		4.0
Max Green Setting (Gmax), s	6.5	16.0			6.5	16.0		16.0
Max Q Clear Time (g_c+I1), s	5.7	7.1			4.3	2.0		6.8
Green Ext Time (p_c), s	0.0	3.4			0.0	4.3		0.9

Intersection Summary		
HCM 2010 Ctrl Delay		12.0
HCM 2010 LOS		B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	540	54	85	491	0	86	0	110	0	0	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1900	1863	1881	1900	1900	1881	1900	1900	1900	1900
Adj Flow Rate, veh/h	0	557	56	88	506	0	89	0	113	0	0	0
Adj No. of Lanes	0	2	0	1	2	0	0	1	1	0	1	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	0	2	2	2	1	1	0	0	0	0	0	0
Cap, veh/h	0	1949	196	111	2619	0	297	0	173	0	204	0
Arrive On Green	0.00	1.00	1.00	0.06	0.73	0.00	0.11	0.00	0.11	0.00	0.00	0.00
Sat Flow, veh/h	0	3342	326	1774	3668	0	1422	0	1610	0	1900	0
Grp Volume(v), veh/h	0	303	310	88	506	0	89	0	113	0	0	0
Grp Sat Flow(s),veh/h/ln	0	1770	1805	1774	1787	0	1422	0	1610	0	1900	0
Q Serve(g_s), s	0.0	0.0	0.0	2.4	2.2	0.0	3.0	0.0	3.4	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	2.4	2.2	0.0	3.0	0.0	3.4	0.0	0.0	0.0
Prop In Lane	0.00		0.18	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	0	1062	1083	111	2619	0	297	0	173	0	204	0
V/C Ratio(X)	0.00	0.29	0.29	0.79	0.19	0.00	0.30	0.00	0.65	0.00	0.00	0.00
Avail Cap(c_a), veh/h	0	1062	1083	231	2619	0	599	0	515	0	608	0
HCM Platoon Ratio	1.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.94	0.94	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	23.1	2.1	0.0	21.3	0.0	21.4	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.6	0.6	4.6	0.2	0.0	0.2	0.0	1.6	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.2	0.2	1.3	1.1	0.0	1.2	0.0	1.6	0.0	0.0	0.0
LnGrp Delay(d),s/veh	0.0	0.6	0.6	27.7	2.2	0.0	21.5	0.0	23.0	0.0	0.0	0.0
LnGrp LOS		A	A	C	A		C		C			
Approach Vol, veh/h		613			594			202			0	
Approach Delay, s/veh		0.6			6.0			22.3			0.0	
Approach LOS		A			A			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	6.6	34.0		9.4		40.6		9.4
Change Period (Y+Rc), s	3.5	4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s	6.5	16.0		16.0		26.0		16.0
Max Q Clear Time (g_c+I1), s	4.4	2.0		0.0		4.2		5.4
Green Ext Time (p_c), s	0.0	7.0		0.0		8.9		0.3

Intersection Summary		
HCM 2010 Ctrl Delay		6.0
HCM 2010 LOS		A

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	417	0	64	0	1	0	33	25	0	0	22	418
Conflicting Peds, #/hr	0	0	0	0	0	0	2	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	210	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	92	91	92	92	92	91	91	92	92	91	91
Heavy Vehicles, %	2	0	0	0	0	0	4	0	0	0	0	1
Mvmt Flow	458	0	70	0	1	0	36	27	0	0	24	459

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	2	0	0	15	919	2	17	919	1
Stage 1	-	-	-	-	-	-	2	918	-	1	1	-
Stage 2	-	-	-	-	-	-	13	1	-	16	918	-
Critical Hdwy	4.12	-	-	-	-	-	7.14	6.5	-	7.1	6.5	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.14	5.5	-	-	-	-
Follow-up Hdwy	2.218	-	-	-	-	-	3.536	4	-	3.5	4	3.309
Pot Cap-1 Maneuver	1622	-	-	-	-	-	996	273	-	1003	273	1087
Stage 1	-	-	-	-	-	-	-	-	-	1027	899	-
Stage 2	-	-	-	-	-	-	1002	899	-	-	-	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1622	-	-	-	-	-	557	196	-	-	196	1087
Mov Cap-2 Maneuver	-	-	-	-	-	-	280	~ -739	-	-	~ -71	-
Stage 1	-	-	-	-	-	-	-	-	-	737	899	-
Stage 2	-	-	-	-	-	-	563	899	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	7	0		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	280	-	1622	-	-	-	-	-	-	1087
HCM Lane V/C Ratio	0.13	-	0.283	-	-	-	-	-	-	0.423
HCM Control Delay (s)	19.8	-	8.1	-	-	0	-	-	-	10.7
HCM Lane LOS	C	-	A	-	-	A	-	-	-	B
HCM 95th %tile Q(veh)	0.4	-	1.2	-	-	-	-	-	-	2.1

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	277	22	199	34	13	18	259	1372	10	13	1280	153
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.96	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1869	1900	1863	1763	1900	1900	1845	1900	1900	1881	1881
Adj Flow Rate, veh/h	262	65	209	34	16	19	273	1444	11	14	1347	0
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	7	7	2	5	5	0	3	3	0	1	1
Cap, veh/h	333	72	233	115	46	55	293	1897	14	42	1406	629
Arrive On Green	0.19	0.19	0.19	0.06	0.06	0.06	0.16	0.53	0.53	0.02	0.39	0.00
Sat Flow, veh/h	1774	385	1239	1774	717	852	1810	3566	27	1810	3574	1599
Grp Volume(v), veh/h	262	0	274	34	0	35	273	710	745	14	1347	0
Grp Sat Flow(s),veh/h/ln	1774	0	1625	1774	0	1569	1810	1753	1840	1810	1787	1599
Q Serve(g_s), s	12.4	0.0	14.6	1.6	0.0	1.9	13.1	28.1	28.1	0.7	32.4	0.0
Cycle Q Clear(g_c), s	12.4	0.0	14.6	1.6	0.0	1.9	13.1	28.1	28.1	0.7	32.4	0.0
Prop In Lane	1.00		0.76	1.00		0.54	1.00		0.01	1.00		1.00
Lane Grp Cap(c), veh/h	333	0	305	115	0	102	293	933	979	42	1406	629
V/C Ratio(X)	0.79	0.00	0.90	0.30	0.00	0.34	0.93	0.76	0.76	0.34	0.96	0.00
Avail Cap(c_a), veh/h	333	0	305	141	0	124	293	933	979	150	1421	636
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	34.2	0.0	35.0	39.4	0.0	39.5	36.5	16.2	16.2	42.5	26.1	0.0
Incr Delay (d2), s/veh	12.1	0.0	27.7	2.0	0.0	2.8	35.0	4.1	4.0	4.6	15.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.2	0.0	8.9	0.9	0.0	0.9	9.4	14.5	15.2	0.4	18.9	0.0
LnGrp Delay(d),s/veh	46.3	0.0	62.7	41.4	0.0	42.4	71.5	20.4	20.2	47.1	41.3	0.0
LnGrp LOS	D		E	D		D	E	C	C	D	D	
Approach Vol, veh/h		536			69			1728			1361	
Approach Delay, s/veh		54.7			41.9			28.4			41.4	
Approach LOS		D			D			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.8	18.0	39.6		9.9	5.7	51.9
Change Period (Y+Rc), s		* 4.2	3.7	4.9		4.2	3.7	4.9
Max Green Setting (Gmax), s		* 17	14.3	35.1		7.0	7.3	42.1
Max Q Clear Time (g_c+I1), s		16.6	15.1	34.4		3.9	2.7	30.1
Green Ext Time (p_c), s		0.0	0.0	0.3		0.1	0.0	11.6

Intersection Summary	
HCM 2010 Ctrl Delay	37.2
HCM 2010 LOS	D

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	982	17	17	23	12	52	13	1620	14	54	1471	745
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1723		1715	1775	1615	1805	3534		1805	3574	1583
Flt Permitted	0.95	1.00		0.95	0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1723		1715	1775	1615	1805	3534		1805	3574	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1023	18	18	24	12	54	14	1688	15	56	1532	776
RTOR Reduction (vph)	0	13	0	0	0	51	0	1	0	0	0	0
Lane Group Flow (vph)	1023	23	0	18	18	3	14	1702	0	56	1532	776
Heavy Vehicles (%)	2%	0%	4%	0%	0%	0%	0%	2%	3%	0%	1%	2%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA		Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6						Free
Actuated Green, G (s)	42.7	42.7		7.0	7.0	7.0	3.1	67.4		6.2	71.0	141.2
Effective Green, g (s)	42.7	42.7		7.0	7.0	7.0	3.1	67.4		6.2	71.0	141.2
Actuated g/C Ratio	0.30	0.30		0.05	0.05	0.05	0.02	0.48		0.04	0.50	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)	1038	521		85	87	80	39	1686		79	1797	1583
v/s Ratio Prot	c0.30	0.01		0.01	0.01		0.01	c0.48		0.03	0.43	
v/s Ratio Perm						0.00						c0.49
v/c Ratio	0.99	0.04		0.21	0.21	0.03	0.36	1.01		0.71	0.85	0.49
Uniform Delay, d1	48.9	34.8		64.5	64.4	63.9	68.1	36.9		66.6	30.5	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	24.3	0.1		2.1	2.0	0.3	5.6	24.3		25.1	4.6	1.1
Delay (s)	73.3	34.9		66.6	66.5	64.2	73.6	61.2		91.7	35.1	1.1
Level of Service	E	C		E	E	E	E	E		F	D	A
Approach Delay (s)		72.0			65.1			61.3			25.3	
Approach LOS		E			E			E			C	

Intersection Summary			
HCM 2000 Control Delay	47.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	141.2	Sum of lost time (s)	17.9
Intersection Capacity Utilization	91.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	171	10	20	40	10	30	38	526	18	11	367	78
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.99	0.99		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1887	1900	1900	1800	1863	1881	1846	1900	1827	1851	1900
Adj Flow Rate, veh/h	184	11	22	43	11	32	41	566	19	12	395	84
Adj No. of Lanes	1	1	0	0	1	1	1	2	0	1	2	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	0	0	0	0	2	1	3	3	4	3	3
Cap, veh/h	627	141	282	540	105	396	590	1362	46	541	1135	239
Arrive On Green	0.25	0.25	0.25	0.25	0.25	0.25	0.39	0.39	0.39	0.39	0.39	0.39
Sat Flow, veh/h	1346	558	1116	1006	417	1568	917	3463	116	808	2887	608
Grp Volume(v), veh/h	184	0	33	54	0	32	41	286	299	12	239	240
Grp Sat Flow(s),veh/h/ln	1346	0	1675	1423	0	1568	917	1754	1825	808	1758	1736
Q Serve(g_s), s	2.8	0.0	0.3	0.0	0.0	0.4	0.7	2.7	2.7	0.2	2.2	2.2
Cycle Q Clear(g_c), s	3.3	0.0	0.3	0.5	0.0	0.4	2.9	2.7	2.7	2.9	2.2	2.2
Prop In Lane	1.00		0.67	0.80		1.00	1.00		0.06	1.00		0.35
Lane Grp Cap(c), veh/h	627	0	422	646	0	396	590	690	718	541	692	683
V/C Ratio(X)	0.29	0.00	0.08	0.08	0.00	0.08	0.07	0.42	0.42	0.02	0.35	0.35
Avail Cap(c_a), veh/h	1481	0	1484	1524	0	1390	920	1321	1374	832	1325	1308
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	7.8	0.0	6.4	6.5	0.0	6.4	5.9	5.0	5.0	6.0	4.8	4.8
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.0	0.2	0.3	0.0	0.2	0.2	1.3	1.4	0.1	1.0	1.0
LnGrp Delay(d),s/veh	7.9	0.0	6.5	6.5	0.0	6.5	5.9	5.1	5.1	6.0	4.9	4.9
LnGrp LOS	A		A	A		A	A	A	A	A	A	A
Approach Vol, veh/h		217			86			626			491	
Approach Delay, s/veh		7.7			6.5			5.2			5.0	
Approach LOS		A			A			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		9.7		12.9		9.7		12.9
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		20.0		17.0		20.0		17.0
Max Q Clear Time (g_c+I1), s		5.3		4.9		2.5		4.9
Green Ext Time (p_c), s		0.6		3.6		0.6		3.6

Intersection Summary	
HCM 2010 Ctrl Delay	5.6
HCM 2010 LOS	A

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	0	802	458	59	1116	694
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9	4.9	4.9	4.0
Lane Util. Factor		0.88	1.00	1.00	0.97	1.00
Frt		0.85	1.00	0.85	1.00	1.00
Flt Protected		1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		2760	1863	1509	3335	1759
Flt Permitted		1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		2760	1863	1509	3335	1759
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	872	498	64	1213	754
RTOR Reduction (vph)	0	258	0	9	0	0
Lane Group Flow (vph)	0	614	498	55	1213	754
Heavy Vehicles (%)	0%	3%	2%	7%	5%	8%
Turn Type		Over	NA	Perm	Prot	NA
Protected Phases		3	2		3	Free
Permitted Phases				2		
Actuated Green, G (s)		25.4	20.6	20.6	25.4	55.8
Effective Green, g (s)		25.4	20.6	20.6	25.4	55.8
Actuated g/C Ratio		0.46	0.37	0.37	0.46	1.00
Clearance Time (s)		4.9	4.9	4.9	4.9	
Vehicle Extension (s)		4.5	3.5	3.5	4.5	
Lane Grp Cap (vph)		1256	687	557	1518	1759
v/s Ratio Prot		0.22	c0.27		c0.36	0.43
v/s Ratio Perm				0.04		
v/c Ratio		0.49	0.72	0.10	0.80	0.43
Uniform Delay, d1		10.7	15.2	11.5	13.0	0.0
Progression Factor		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.5	3.9	0.1	3.4	0.8
Delay (s)		11.2	19.1	11.6	16.4	0.8
Level of Service		B	B	B	B	A
Approach Delay (s)	11.2		18.2			10.4
Approach LOS	B		B			B

Intersection Summary			
HCM 2000 Control Delay	11.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	55.8	Sum of lost time (s)	9.8
Intersection Capacity Utilization	64.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	27	747	401	421	683	5	86	5	268	10	17	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		0.95	0.95	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00	1.00		1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.98	1.00
Satd. Flow (prot)	1736	3374	1563	3467	3501		1618	1641	1524		1681	1559
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.98	1.00
Satd. Flow (perm)	1736	3374	1563	3467	3501		1618	1641	1524		1681	1559
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	31	849	456	478	776	6	98	6	305	11	19	38
RTOR Reduction (vph)	0	0	278	0	0	0	0	0	257	0	0	37
Lane Group Flow (vph)	31	849	178	478	782	0	52	52	48	0	30	1
Confl. Peds. (#/hr)	2		1			1	1			1		2
Heavy Vehicles (%)	4%	7%	2%	1%	3%	0%	6%	0%	6%	30%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Over	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	7	7	
Permitted Phases			2									7
Actuated Green, G (s)	1.8	22.6	22.6	9.2	30.1		4.3	4.3	9.2		1.5	1.5
Effective Green, g (s)	1.8	22.6	22.6	9.2	30.1		4.3	4.3	9.2		1.5	1.5
Actuated g/C Ratio	0.03	0.39	0.39	0.16	0.52		0.07	0.07	0.16		0.03	0.03
Clearance Time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Vehicle Extension (s)	1.0	1.3	1.3	1.0	1.3		1.0	1.0	1.0		1.0	1.0
Lane Grp Cap (vph)	53	1314	609	549	1816		119	121	241		43	40
v/s Ratio Prot	0.02	c0.25		c0.14	0.22		c0.03	0.03	0.03		c0.02	
v/s Ratio Perm			0.11									0.00
v/c Ratio	0.58	0.65	0.29	0.87	0.43		0.44	0.43	0.20		0.70	0.02
Uniform Delay, d1	27.7	14.4	12.2	23.8	8.6		25.7	25.7	21.2		28.0	27.5
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	10.2	0.8	0.1	13.7	0.1		0.9	0.9	0.2		32.8	0.1
Delay (s)	37.9	15.3	12.3	37.5	8.7		26.6	26.6	21.4		60.9	27.6
Level of Service	D	B	B	D	A		C	C	C		E	C
Approach Delay (s)		14.8			19.6			22.7			42.3	
Approach LOS		B			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	18.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	58.0	Sum of lost time (s)	20.4
Intersection Capacity Utilization	54.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	133	221	36	131	177	151	23	233	81	298	355	41
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1842	1900	1863	1810	1827	1759	1827	1863	1827	1820	1900
Adj Flow Rate, veh/h	145	240	39	142	192	164	25	253	88	324	386	45
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	2	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	3	3	2	5	4	8	4	2	4	4	4
Cap, veh/h	215	634	102	214	379	321	76	451	388	502	560	65
Arrive On Green	0.12	0.21	0.21	0.12	0.21	0.21	0.05	0.25	0.25	0.15	0.35	0.35
Sat Flow, veh/h	1774	3021	484	1774	1810	1534	1675	1827	1574	3375	1599	186
Grp Volume(v), veh/h	145	138	141	142	192	164	25	253	88	324	0	431
Grp Sat Flow(s),veh/h/ln	1774	1750	1755	1774	1810	1534	1675	1827	1574	1688	0	1785
Q Serve(g_s), s	4.7	4.1	4.2	4.6	5.7	5.7	0.9	7.3	2.7	5.4	0.0	12.5
Cycle Q Clear(g_c), s	4.7	4.1	4.2	4.6	5.7	5.7	0.9	7.3	2.7	5.4	0.0	12.5
Prop In Lane	1.00		0.28	1.00		1.00	1.00		1.00	1.00		0.10
Lane Grp Cap(c), veh/h	215	367	368	214	379	321	76	451	388	502	0	625
V/C Ratio(X)	0.67	0.37	0.38	0.66	0.51	0.51	0.33	0.56	0.23	0.65	0.00	0.69
Avail Cap(c_a), veh/h	274	811	813	274	838	711	223	789	679	577	0	839
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	25.3	20.4	20.4	25.3	21.1	21.1	27.9	19.8	18.1	24.1	0.0	16.8
Incr Delay (d2), s/veh	4.4	0.8	0.8	4.0	1.3	1.5	2.5	1.3	0.4	2.0	0.0	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	2.0	2.1	2.5	3.0	2.5	0.5	3.8	1.2	2.7	0.0	6.4
LnGrp Delay(d),s/veh	29.7	21.2	21.2	29.3	22.3	22.6	30.3	21.2	18.4	26.1	0.0	18.5
LnGrp LOS	C	C	C	C	C	C	C	C	B	C		B
Approach Vol, veh/h		424			498			366			755	
Approach Delay, s/veh		24.1			24.4			21.1			21.8	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.0	16.8	6.4	26.0	11.0	16.8	12.7	19.8
Change Period (Y+Rc), s	3.7	* 4.2	3.7	4.9	3.7	* 4.2	3.7	4.9
Max Green Setting (Gmax), s	9.3	* 28	8.0	28.3	9.3	* 28	10.3	26.0
Max Q Clear Time (g_c+I1), s	6.6	6.2	2.9	14.5	6.7	7.7	7.4	9.3
Green Ext Time (p_c), s	0.1	4.3	0.0	4.2	0.1	4.2	0.3	4.6

Intersection Summary		
HCM 2010 Ctrl Delay		22.8
HCM 2010 LOS		C

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	53	388	83	100	270	0	140	0	77	0	0	0
Number	5	2	12	1	6	16	3	8	18			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1900	1860	1900	1810	1792	0	1810	1696	1900			
Adj Flow Rate, veh/h	58	426	91	110	297	0	154	0	85			
Adj No. of Lanes	1	2	0	1	2	0	2	1	0			
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91			
Percent Heavy Veh, %	0	2	2	5	6	0	5	0	5			
Cap, veh/h	80	1708	362	137	2126	0	340	0	146			
Arrive On Green	0.04	0.59	0.59	0.16	1.00	0.00	0.10	0.00	0.10			
Sat Flow, veh/h	1810	2901	615	1723	3495	0	3343	0	1442			
Grp Volume(v), veh/h	58	258	259	110	297	0	154	0	85			
Grp Sat Flow(s),veh/h/ln	1810	1767	1749	1723	1703	0	1672	0	1442			
Q Serve(g_s), s	1.6	3.5	3.6	3.1	0.0	0.0	2.2	0.0	2.8			
Cycle Q Clear(g_c), s	1.6	3.5	3.6	3.1	0.0	0.0	2.2	0.0	2.8			
Prop In Lane	1.00		0.35	1.00		0.00	1.00		1.00			
Lane Grp Cap(c), veh/h	80	1040	1030	137	2126	0	340	0	146			
V/C Ratio(X)	0.72	0.25	0.25	0.80	0.14	0.00	0.45	0.00	0.58			
Avail Cap(c_a), veh/h	199	1040	1030	224	2126	0	1070	0	461			
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.87	0.87	0.87	1.00	1.00	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	23.6	5.0	5.0	20.6	0.0	0.0	21.2	0.0	21.4			
Incr Delay (d2), s/veh	4.0	0.5	0.5	4.0	0.1	0.0	0.4	0.0	1.4			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.9	1.8	1.9	1.6	0.0	0.0	1.0	0.0	1.2			
LnGrp Delay(d),s/veh	27.6	5.4	5.5	24.7	0.1	0.0	21.5	0.0	22.8			
LnGrp LOS	C	A	A	C	A		C		C			
Approach Vol, veh/h		575			407			239				
Approach Delay, s/veh		7.7			6.8			22.0				
Approach LOS		A			A			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	7.5	33.4			5.7	35.2		9.1
Change Period (Y+Rc), s	3.5	4.0			3.5	4.0		4.0
Max Green Setting (Gmax), s	6.5	16.0			5.5	17.0		16.0
Max Q Clear Time (g_c+I1), s	5.1	5.6			3.6	2.0		4.8
Green Ext Time (p_c), s	0.0	2.8			0.0	3.3		0.5

Intersection Summary		
HCM 2010 Ctrl Delay		10.2
HCM 2010 LOS		B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	373	92	61	338	1	32	0	38	0	0	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	0.99		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1820	1900	1845	1845	1900	1900	1638	1712	1900	1900	1900
Adj Flow Rate, veh/h	0	449	111	73	407	1	39	0	46	0	0	0
Adj No. of Lanes	0	2	0	1	2	0	0	1	1	0	1	0
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	0	4	4	3	3	3	0	0	11	0	0	0
Cap, veh/h	0	1825	448	91	2814	7	212	0	80	0	105	0
Arrive On Green	0.00	0.22	0.22	0.05	0.78	0.78	0.06	0.00	0.06	0.00	0.00	0.00
Sat Flow, veh/h	0	2844	676	1757	3587	9	1228	0	1444	0	1900	0
Grp Volume(v), veh/h	0	281	279	73	199	209	39	0	46	0	0	0
Grp Sat Flow(s),veh/h/ln	0	1729	1700	1757	1753	1843	1228	0	1444	0	1900	0
Q Serve(g_s), s	0.0	6.7	6.8	2.1	1.4	1.4	1.5	0.0	1.6	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	6.7	6.8	2.1	1.4	1.4	1.5	0.0	1.6	0.0	0.0	0.0
Prop In Lane	0.00		0.40	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	0	1146	1127	91	1375	1446	212	0	80	0	105	0
V/C Ratio(X)	0.00	0.24	0.25	0.80	0.14	0.14	0.18	0.00	0.57	0.00	0.00	0.00
Avail Cap(c_a), veh/h	0	1146	1127	193	1375	1446	537	0	462	0	608	0
HCM Platoon Ratio	1.00	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.98	0.98	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	9.2	9.2	23.5	1.3	1.3	23.0	0.0	23.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.5	0.5	6.1	0.2	0.2	0.2	0.0	2.4	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.4	3.4	1.1	0.7	0.8	0.5	0.0	0.7	0.0	0.0	0.0
LnGrp Delay(d),s/veh	0.0	9.7	9.7	29.5	1.5	1.5	23.2	0.0	25.4	0.0	0.0	0.0
LnGrp LOS		A	A	C	A	A	C		C			
Approach Vol, veh/h		560			481			85			0	
Approach Delay, s/veh		9.7			5.8			24.4			0.0	
Approach LOS		A			A			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	6.1	37.1		6.8		43.2		6.8
Change Period (Y+Rc), s	3.5	4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s	5.5	17.0		16.0		26.0		16.0
Max Q Clear Time (g_c+I1), s	4.1	8.8		0.0		3.4		3.6
Green Ext Time (p_c), s	0.0	4.0		0.0		7.2		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	9.1
HCM 2010 LOS	A

Intersection

Int Delay, s/veh 2.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	226	0	16	0	1	0	17	14	0	0	32	328
Conflicting Peds, #/hr	2	0	2	0	0	0	2	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	210	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	1	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	92	80	92	92	92	80	80	92	92	80	80
Heavy Vehicles, %	7	0	0	2	2	2	0	7	0	0	0	2
Mvmt Flow	282	0	20	0	1	0	21	18	0	0	40	410

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	3	0	0	2	0	0	25	570	2	14	570	5
Stage 1	-	-	-	-	-	-	2	567	-	3	3	-
Stage 2	-	-	-	-	-	-	23	3	-	11	567	-
Critical Hdwy	4.17	-	-	-	-	-	7.1	6.57	-	7.1	6.5	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.57	-	-	-	-
Follow-up Hdwy	2.263	-	-	-	-	-	3.5	4.063	-	3.5	4	3.318
Pot Cap-1 Maneuver	1587	-	-	-	-	-	991	425	-	1007	434	1078
Stage 1	-	-	-	-	-	-	-	-	-	1025	897	-
Stage 2	-	-	-	-	-	-	1000	883	-	-	-	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1584	-	-	-	-	-	552	348	-	-	355	1074
Mov Cap-2 Maneuver	-	-	-	-	-	-	349	1134	-	-	~ -626	-
Stage 1	-	-	-	-	-	-	-	-	-	840	896	-
Stage 2	-	-	-	-	-	-	590	882	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	7.3	0		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	349	-	1584	-	-	-	-	-	-	1074
HCM Lane V/C Ratio	0.061	-	0.178	-	-	-	-	-	-	0.382
HCM Control Delay (s)	16	-	7.8	-	-	0	-	-	-	10.4
HCM Lane LOS	C	-	A	-	-	A	-	-	-	B
HCM 95th %tile Q(veh)	0.2	-	0.6	-	-	-	-	-	-	1.8

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	213	40	119	134	38	50	146	1053	37	16	1478	137
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.94	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1869	1900	1900	1842	1900	1827	1840	1900	1357	1827	1845
Adj Flow Rate, veh/h	214	89	137	128	81	57	168	1210	43	18	1699	0
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	3	0	0	0	9	9	4	3	3	40	4	3
Cap, veh/h	290	107	165	151	82	57	163	1829	65	37	1618	731
Arrive On Green	0.16	0.16	0.16	0.08	0.08	0.08	0.09	0.53	0.53	0.03	0.47	0.00
Sat Flow, veh/h	1757	651	1003	1810	977	688	1740	3441	122	1293	3471	1568
Grp Volume(v), veh/h	214	0	226	128	0	138	168	614	639	18	1699	0
Grp Sat Flow(s),veh/h/ln	1757	0	1654	1810	0	1665	1740	1748	1816	1293	1736	1568
Q Serve(g_s), s	10.3	0.0	11.7	6.2	0.0	7.3	8.3	22.5	22.5	1.2	41.3	0.0
Cycle Q Clear(g_c), s	10.3	0.0	11.7	6.2	0.0	7.3	8.3	22.5	22.5	1.2	41.3	0.0
Prop In Lane	1.00		0.61	1.00		0.41	1.00		0.07	1.00		1.00
Lane Grp Cap(c), veh/h	290	0	273	151	0	139	163	929	965	37	1618	731
V/C Ratio(X)	0.74	0.00	0.83	0.85	0.00	0.99	1.03	0.66	0.66	0.49	1.05	0.00
Avail Cap(c_a), veh/h	317	0	299	151	0	139	163	929	965	106	1618	731
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	35.2	0.0	35.8	40.1	0.0	40.6	40.2	15.0	15.0	42.4	23.7	0.0
Incr Delay (d2), s/veh	8.5	0.0	16.8	34.6	0.0	74.0	78.9	2.1	2.1	9.9	36.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.7	0.0	6.6	4.5	0.0	6.2	7.5	11.3	11.7	0.5	27.8	0.0
LnGrp Delay(d),s/veh	43.7	0.0	52.5	74.7	0.0	114.6	119.3	17.1	17.1	52.3	60.5	0.0
LnGrp LOS	D		D	E		F	F	B	B	D	F	
Approach Vol, veh/h		440			266			1421			1717	
Approach Delay, s/veh		48.2			95.4			29.2			60.4	
Approach LOS		D			F			C			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		18.8	12.0	46.2		11.6	6.2	52.0
Change Period (Y+Rc), s		* 4.2	3.7	4.9		4.2	3.7	4.9
Max Green Setting (Gmax), s		* 16	8.3	41.3		7.4	7.3	42.3
Max Q Clear Time (g_c+I1), s		13.7	10.3	43.3		9.3	3.2	24.5
Green Ext Time (p_c), s		0.6	0.0	0.0		0.0	0.0	17.2

Intersection Summary		
HCM 2010 Ctrl Delay	49.9	
HCM 2010 LOS	D	

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	402	5	17	18	14	49	19	1291	10	32	1619	702
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.88		1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.99	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1681		1665	1782	1572	1736	3531		1770	3438	1538
Flt Permitted	0.95	1.00		0.95	0.99	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1681		1665	1782	1572	1736	3531		1770	3438	1538
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	467	6	20	21	16	57	22	1501	12	37	1883	816
RTOR Reduction (vph)	0	17	0	0	0	54	0	0	0	0	0	0
Lane Group Flow (vph)	467	9	0	18	19	3	22	1513	0	37	1883	816
Confl. Peds. (#/hr)				1		1			1	1		
Heavy Vehicles (%)	2%	0%	0%	3%	0%	1%	4%	2%	13%	2%	5%	5%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA		Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6						Free
Actuated Green, G (s)	18.9	18.9		6.8	6.8	6.8	4.5	69.7		4.5	70.2	117.8
Effective Green, g (s)	18.9	18.9		6.8	6.8	6.8	4.5	69.7		4.5	70.2	117.8
Actuated g/C Ratio	0.16	0.16		0.06	0.06	0.06	0.04	0.59		0.04	0.60	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)	550	269		96	102	90	66	2089		67	2048	1538
v/s Ratio Prot	c0.14	0.01		0.01	0.01		0.01	0.43		0.02	c0.55	
v/s Ratio Perm						0.00						c0.53
v/c Ratio	0.85	0.03		0.19	0.19	0.04	0.33	0.72		0.55	0.92	0.53
Uniform Delay, d1	48.1	41.7		52.9	52.9	52.4	55.2	17.2		55.7	21.3	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	12.6	0.1		1.6	1.5	0.3	3.0	1.6		9.5	7.6	1.3
Delay (s)	60.6	41.8		54.5	54.4	52.7	58.2	18.7		65.2	28.8	1.3
Level of Service	E	D		D	D	D	E	B		E	C	A
Approach Delay (s)		59.6			53.4			19.3			21.1	
Approach LOS		E			D			B			C	

Intersection Summary				
HCM 2000 Control Delay	25.1	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.91			
Actuated Cycle Length (s)	117.8	Sum of lost time (s)	17.9	
Intersection Capacity Utilization	70.8%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM 2010 Signalized Intersection Summary
9: Carmel Rancho Blvd & Shopping Center Dwy

Back + Proj Alt 2 AM.syn
3/14/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	54	1	19	9	1	20	17	208	15	76	520	168
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		1.00	1.00		0.99	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1882	1900	1900	1785	1863	1881	1848	1900	1827	1853	1900
Adj Flow Rate, veh/h	70	1	25	12	1	26	22	270	19	99	675	218
Adj No. of Lanes	1	1	0	0	1	1	1	2	0	1	2	0
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Percent Heavy Veh, %	0	0	0	0	0	2	1	3	3	4	3	3
Cap, veh/h	486	7	179	458	21	182	550	1664	116	829	1307	422
Arrive On Green	0.12	0.12	0.12	0.12	0.12	0.12	0.50	0.50	0.50	0.50	0.50	0.50
Sat Flow, veh/h	1392	62	1545	1086	179	1573	626	3329	233	1062	2616	844
Grp Volume(v), veh/h	70	0	26	13	0	26	22	142	147	99	454	439
Grp Sat Flow(s),veh/h/ln	1392	0	1606	1265	0	1573	626	1756	1806	1062	1761	1699
Q Serve(g_s), s	1.0	0.0	0.3	0.0	0.0	0.3	0.5	0.9	0.9	1.2	3.6	3.6
Cycle Q Clear(g_c), s	1.3	0.0	0.3	0.3	0.0	0.3	4.1	0.9	0.9	2.1	3.6	3.6
Prop In Lane	1.00		0.96	0.92		1.00	1.00		0.13	1.00		0.50
Lane Grp Cap(c), veh/h	486	0	186	479	0	182	550	877	903	829	880	849
V/C Ratio(X)	0.14	0.00	0.14	0.03	0.00	0.14	0.04	0.16	0.16	0.12	0.52	0.52
Avail Cap(c_a), veh/h	1662	0	1543	1616	0	1512	748	1434	1475	1166	1438	1388
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	8.9	0.0	8.3	8.2	0.0	8.3	4.9	2.8	2.8	3.4	3.5	3.5
Incr Delay (d2), s/veh	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.1	0.1	0.0	0.1	0.1	0.4	0.5	0.3	1.7	1.6
LnGrp Delay(d),s/veh	8.9	0.0	8.4	8.2	0.0	8.4	4.9	2.9	2.9	3.4	3.7	3.7
LnGrp LOS	A		A	A		A	A	A	A	A	A	A
Approach Vol, veh/h		96			39			311			992	
Approach Delay, s/veh		8.8			8.3			3.0			3.7	
Approach LOS		A			A			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		6.4		14.4		6.4		14.4
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		20.0		17.0		20.0		17.0
Max Q Clear Time (g_c+I1), s		3.3		5.6		2.3		6.1
Green Ext Time (p_c), s		0.2		4.2		0.2		4.1

Intersection Summary	
HCM 2010 Ctrl Delay	4.0
HCM 2010 LOS	A

HCM Signalized Intersection Capacity Analysis
1: SR 1 & Carmel Valley Rd

Back + Proj Alt 2 PM.syn
3/14/2016

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	0	930	777	98	936	617
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9	4.9	4.9	4.0
Lane Util. Factor		0.88	1.00	1.00	0.97	1.00
Frt		0.85	1.00	0.85	1.00	1.00
Flt Protected		1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		2814	1863	1553	3467	1881
Flt Permitted		1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		2814	1863	1553	3467	1881
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	989	827	104	996	656
RTOR Reduction (vph)	0	170	0	6	0	0
Lane Group Flow (vph)	0	819	827	98	996	656
Heavy Vehicles (%)	0%	1%	2%	4%	1%	1%
Turn Type		Over	NA	Perm	Prot	NA
Protected Phases		3	2		3	Free
Permitted Phases				2		
Actuated Green, G (s)		20.3	31.1	31.1	20.3	61.2
Effective Green, g (s)		20.3	31.1	31.1	20.3	61.2
Actuated g/C Ratio		0.33	0.51	0.51	0.33	1.00
Clearance Time (s)		4.9	4.9	4.9	4.9	
Vehicle Extension (s)		4.5	3.5	3.5	4.5	
Lane Grp Cap (vph)		933	946	789	1150	1881
v/s Ratio Prot		c0.29	c0.44		0.29	0.35
v/s Ratio Perm				0.06		
v/c Ratio		0.88	0.87	0.12	0.87	0.35
Uniform Delay, d1		19.3	13.3	7.9	19.2	0.0
Progression Factor		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		9.9	9.2	0.1	7.5	0.5
Delay (s)		29.2	22.6	8.0	26.7	0.5
Level of Service		C	C	A	C	A
Approach Delay (s)	29.2		20.9			16.3
Approach LOS	C		C			B

Intersection Summary			
HCM 2000 Control Delay	21.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	61.2	Sum of lost time (s)	9.8
Intersection Capacity Utilization	81.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	810	193	331	635	4	277	17	534	4	23	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		0.95	0.95	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	1.00
Satd. Flow (prot)	1805	3539	1615	3467	3571		1715	1728	1599		1887	1553
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	1.00
Satd. Flow (perm)	1805	3539	1615	3467	3571		1715	1728	1599		1887	1553
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	33	862	205	352	676	4	295	18	568	4	24	19
RTOR Reduction (vph)	0	0	133	0	1	0	0	0	485	0	0	19
Lane Group Flow (vph)	33	862	72	352	679	0	156	157	83	0	28	0
Heavy Vehicles (%)	0%	2%	0%	1%	1%	0%	0%	0%	1%	0%	0%	4%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Over	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	7	7	
Permitted Phases			2									7
Actuated Green, G (s)	1.9	21.8	21.8	9.0	29.0		9.1	9.1	9.0		1.6	1.6
Effective Green, g (s)	1.9	21.8	21.8	9.0	29.0		9.1	9.1	9.0		1.6	1.6
Actuated g/C Ratio	0.03	0.35	0.35	0.15	0.47		0.15	0.15	0.15		0.03	0.03
Clearance Time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Vehicle Extension (s)	1.0	1.3	1.3	1.0	1.3		1.0	1.0	1.0		1.0	1.0
Lane Grp Cap (vph)	55	1246	568	504	1673		252	254	232		48	40
v/s Ratio Prot	0.02	c0.24		c0.10	0.19		c0.09	0.09	0.05		c0.01	
v/s Ratio Perm			0.04									0.00
v/c Ratio	0.60	0.69	0.13	0.70	0.41		0.62	0.62	0.36		0.58	0.01
Uniform Delay, d1	29.6	17.2	13.6	25.2	10.8		24.8	24.8	23.8		29.8	29.4
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	11.2	1.4	0.0	3.4	0.1		3.2	3.1	0.3		11.1	0.0
Delay (s)	40.8	18.5	13.6	28.6	10.9		27.9	27.9	24.2		40.9	29.4
Level of Service	D	B	B	C	B		C	C	C		D	C
Approach Delay (s)		18.3			16.9			25.5			36.3	
Approach LOS		B			B			C			D	

Intersection Summary				
HCM 2000 Control Delay	20.2	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.67			
Actuated Cycle Length (s)	61.9	Sum of lost time (s)	20.4	
Intersection Capacity Utilization	71.0%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	143	348	83	175	401	295	162	437	155	264	309	44
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1878	1900	1881	1881	1863	1881	1845	1863	1881	1884	1900
Adj Flow Rate, veh/h	146	355	85	179	409	301	165	446	158	269	315	45
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	2	1	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	1	1	1	1	2	1	3	2	1	1	1
Cap, veh/h	168	881	209	211	622	519	199	522	446	357	442	63
Arrive On Green	0.09	0.31	0.31	0.12	0.33	0.33	0.11	0.28	0.28	0.10	0.27	0.27
Sat Flow, veh/h	1774	2864	678	1792	1881	1571	1792	1845	1575	3476	1610	230
Grp Volume(v), veh/h	146	219	221	179	409	301	165	446	158	269	0	360
Grp Sat Flow(s),veh/h/ln	1774	1784	1758	1792	1881	1571	1792	1845	1575	1738	0	1840
Q Serve(g_s), s	7.1	8.5	8.7	8.6	16.3	13.9	7.9	20.0	7.0	6.6	0.0	15.4
Cycle Q Clear(g_c), s	7.1	8.5	8.7	8.6	16.3	13.9	7.9	20.0	7.0	6.6	0.0	15.4
Prop In Lane	1.00		0.39	1.00		1.00	1.00		1.00	1.00		0.13
Lane Grp Cap(c), veh/h	168	549	541	211	622	519	199	522	446	357	0	505
V/C Ratio(X)	0.87	0.40	0.41	0.85	0.66	0.58	0.83	0.85	0.35	0.75	0.00	0.71
Avail Cap(c_a), veh/h	168	549	541	211	622	519	211	570	486	370	0	547
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	39.0	23.9	24.0	37.8	25.0	24.2	38.0	29.6	25.0	38.1	0.0	28.6
Incr Delay (d2), s/veh	34.8	0.6	0.6	26.2	5.4	4.7	22.3	11.7	0.6	8.2	0.0	4.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.1	4.2	4.3	5.8	9.3	6.7	5.1	11.9	3.1	3.6	0.0	8.4
LnGrp Delay(d),s/veh	73.8	24.5	24.6	64.0	30.4	28.9	60.3	41.3	25.6	46.3	0.0	32.8
LnGrp LOS	E	C	C	E	C	C	E	D	C	D		C
Approach Vol, veh/h		586			889			769			629	
Approach Delay, s/veh		36.8			36.7			42.2			38.6	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.0	31.1	13.4	28.9	12.0	33.1	12.7	29.6
Change Period (Y+Rc), s	3.7	* 4.2	3.7	4.9	3.7	* 4.2	3.7	4.9
Max Green Setting (Gmax), s	10.3	* 27	10.3	26.0	8.3	* 29	9.3	27.0
Max Q Clear Time (g_c+I1), s	10.6	10.7	9.9	17.4	9.1	18.3	8.6	22.0
Green Ext Time (p_c), s	0.0	7.2	0.0	3.9	0.0	5.6	0.1	2.6

Intersection Summary	
HCM 2010 Ctrl Delay	38.6
HCM 2010 LOS	D

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	84	461	138	151	449	0	348	0	151	0	0	0
Number	5	2	12	1	6	16	3	8	18			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1900	1867	1900	1881	1881	0	1881	1863	1900			
Adj Flow Rate, veh/h	85	466	139	153	454	0	352	0	153			
Adj No. of Lanes	1	2	0	1	2	0	2	1	0			
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99			
Percent Heavy Veh, %	0	2	2	1	1	0	1	0	1			
Cap, veh/h	108	1372	406	191	1985	0	538	0	245			
Arrive On Green	0.06	0.51	0.51	0.21	1.00	0.00	0.15	0.00	0.15			
Sat Flow, veh/h	1810	2697	799	1792	3668	0	3476	0	1583			
Grp Volume(v), veh/h	85	305	300	153	454	0	352	0	153			
Grp Sat Flow(s),veh/h/ln	1810	1774	1722	1792	1787	0	1738	0	1583			
Q Serve(g_s), s	2.3	5.1	5.2	4.1	0.0	0.0	4.8	0.0	4.5			
Cycle Q Clear(g_c), s	2.3	5.1	5.2	4.1	0.0	0.0	4.8	0.0	4.5			
Prop In Lane	1.00		0.46	1.00		0.00	1.00		1.00			
Lane Grp Cap(c), veh/h	108	902	876	191	1985	0	538	0	245			
V/C Ratio(X)	0.78	0.34	0.34	0.80	0.23	0.00	0.65	0.00	0.62			
Avail Cap(c_a), veh/h	235	902	876	233	1985	0	1112	0	507			
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.87	0.87	0.87	0.99	0.99	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	23.2	7.3	7.3	19.2	0.0	0.0	19.9	0.0	19.8			
Incr Delay (d2), s/veh	4.0	0.9	0.9	12.1	0.3	0.0	0.5	0.0	1.0			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	1.3	2.7	2.6	2.6	0.1	0.0	2.3	0.0	2.0			
LnGrp Delay(d),s/veh	27.2	8.2	8.2	31.3	0.3	0.0	20.4	0.0	20.7			
LnGrp LOS	C	A	A	C	A		C		C			
Approach Vol, veh/h		690			607			505				
Approach Delay, s/veh		10.5			8.1			20.5				
Approach LOS		B			A			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	8.8	29.4			6.5	31.8		11.7
Change Period (Y+Rc), s	3.5	4.0			3.5	4.0		4.0
Max Green Setting (Gmax), s	6.5	16.0			6.5	16.0		16.0
Max Q Clear Time (g_c+I1), s	6.1	7.2			4.3	2.0		6.8
Green Ext Time (p_c), s	0.0	3.4			0.0	4.3		1.0

Intersection Summary	
HCM 2010 Ctrl Delay	12.5
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	558	54	85	514	0	86	0	110	0	0	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1900	1863	1881	1900	1900	1881	1900	1900	1900	1900
Adj Flow Rate, veh/h	0	575	56	88	530	0	89	0	113	0	0	0
Adj No. of Lanes	0	2	0	1	2	0	0	1	1	0	1	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	0	2	2	2	1	1	0	0	0	0	0	0
Cap, veh/h	0	1955	190	111	2619	0	297	0	173	0	204	0
Arrive On Green	0.00	1.00	1.00	0.06	0.73	0.00	0.11	0.00	0.11	0.00	0.00	0.00
Sat Flow, veh/h	0	3353	317	1774	3668	0	1422	0	1610	0	1900	0
Grp Volume(v), veh/h	0	312	319	88	530	0	89	0	113	0	0	0
Grp Sat Flow(s),veh/h/ln	0	1770	1807	1774	1787	0	1422	0	1610	0	1900	0
Q Serve(g_s), s	0.0	0.0	0.0	2.4	2.3	0.0	3.0	0.0	3.4	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	2.4	2.3	0.0	3.0	0.0	3.4	0.0	0.0	0.0
Prop In Lane	0.00		0.18	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	0	1062	1084	111	2619	0	297	0	173	0	204	0
V/C Ratio(X)	0.00	0.29	0.29	0.79	0.20	0.00	0.30	0.00	0.65	0.00	0.00	0.00
Avail Cap(c_a), veh/h	0	1062	1084	231	2619	0	599	0	515	0	608	0
HCM Platoon Ratio	1.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.93	0.93	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	23.1	2.1	0.0	21.3	0.0	21.4	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.7	0.6	4.6	0.2	0.0	0.2	0.0	1.6	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.2	0.2	1.3	1.2	0.0	1.2	0.0	1.6	0.0	0.0	0.0
LnGrp Delay(d),s/veh	0.0	0.7	0.6	27.7	2.3	0.0	21.5	0.0	23.0	0.0	0.0	0.0
LnGrp LOS		A	A	C	A		C		C			
Approach Vol, veh/h		631			618			202			0	
Approach Delay, s/veh		0.7			5.9			22.3			0.0	
Approach LOS		A			A			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	6.6	34.0		9.4		40.6		9.4
Change Period (Y+Rc), s	3.5	4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s	6.5	16.0		16.0		26.0		16.0
Max Q Clear Time (g_c+I1), s	4.4	2.0		0.0		4.3		5.4
Green Ext Time (p_c), s	0.0	7.2		0.0		9.3		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	5.9
HCM 2010 LOS	A

Intersection

Int Delay, s/veh 3.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	435	0	64	0	1	0	33	25	0	0	22	441
Conflicting Peds, #/hr	0	0	0	0	0	0	2	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	210	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	92	91	92	92	92	91	91	92	92	91	91
Heavy Vehicles, %	2	0	0	0	0	0	4	0	0	0	0	1
Mvmt Flow	478	0	70	0	1	0	36	27	0	0	24	485

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	2	0	0	15	959	2	17	959	1
Stage 1	-	-	-	-	-	-	2	958	-	1	1	-
Stage 2	-	-	-	-	-	-	13	1	-	16	958	-
Critical Hdwy	4.12	-	-	-	-	-	7.14	6.5	-	7.1	6.5	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.14	5.5	-	-	-	-
Follow-up Hdwy	2.218	-	-	-	-	-	3.536	4	-	3.5	4	3.309
Pot Cap-1 Maneuver	1622	-	-	-	-	-	996	259	-	1003	259	1087
Stage 1	-	-	-	-	-	-	-	-	-	1027	899	-
Stage 2	-	-	-	-	-	-	1002	899	-	-	-	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1622	-	-	-	-	-	551	182	-	-	182	1087
Mov Cap-2 Maneuver	-	-	-	-	-	-	266	~ -547	-	-	~ -58	-
Stage 1	-	-	-	-	-	-	-	-	-	724	899	-
Stage 2	-	-	-	-	-	-	540	899	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	7.1	0		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	266	-	1622	-	-	-	-	-	-	1087
HCM Lane V/C Ratio	0.136	-	0.295	-	-	-	-	-	-	0.446
HCM Control Delay (s)	20.7	-	8.1	-	-	0	-	-	-	10.9
HCM Lane LOS	C	-	A	-	-	A	-	-	-	B
HCM 95th %tile Q(veh)	0.5	-	1.2	-	-	-	-	-	-	2.3

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	277	22	212	34	13	18	268	1440	10	13	1356	153
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.96	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1870	1900	1863	1763	1900	1900	1845	1900	1900	1881	1881
Adj Flow Rate, veh/h	269	55	223	34	16	19	282	1516	11	14	1427	0
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	7	7	2	5	5	0	3	3	0	1	1
Cap, veh/h	332	60	242	114	46	55	292	1904	14	42	1414	633
Arrive On Green	0.19	0.19	0.19	0.06	0.06	0.06	0.16	0.53	0.53	0.02	0.40	0.00
Sat Flow, veh/h	1774	319	1295	1774	717	852	1810	3567	26	1810	3574	1599
Grp Volume(v), veh/h	269	0	278	34	0	35	282	745	782	14	1427	0
Grp Sat Flow(s),veh/h/ln	1774	0	1614	1774	0	1569	1810	1753	1840	1810	1787	1599
Q Serve(g_s), s	12.9	0.0	15.0	1.6	0.0	1.9	13.7	30.5	30.6	0.7	35.1	0.0
Cycle Q Clear(g_c), s	12.9	0.0	15.0	1.6	0.0	1.9	13.7	30.5	30.6	0.7	35.1	0.0
Prop In Lane	1.00		0.80	1.00		0.54	1.00		0.01	1.00		1.00
Lane Grp Cap(c), veh/h	332	0	302	114	0	101	292	936	982	42	1414	633
V/C Ratio(X)	0.81	0.00	0.92	0.30	0.00	0.35	0.97	0.80	0.80	0.34	1.01	0.00
Avail Cap(c_a), veh/h	332	0	302	140	0	124	292	936	982	149	1414	633
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	34.6	0.0	35.4	39.6	0.0	39.7	37.0	16.8	16.8	42.7	26.8	0.0
Incr Delay (d2), s/veh	14.3	0.0	32.1	2.0	0.0	2.9	43.6	5.3	5.1	4.7	26.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.6	0.0	9.4	0.9	0.0	0.9	10.3	16.1	16.8	0.4	22.2	0.0
LnGrp Delay(d),s/veh	48.8	0.0	67.5	41.6	0.0	42.6	80.5	22.0	21.8	47.3	53.0	0.0
LnGrp LOS	D		E	D		D	F	C	C	D	F	
Approach Vol, veh/h		547			69			1809			1441	
Approach Delay, s/veh		58.3			42.1			31.1			52.9	
Approach LOS		E			D			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.8	18.0	40.0		9.9	5.7	52.3
Change Period (Y+Rc), s		* 4.2	3.7	4.9		4.2	3.7	4.9
Max Green Setting (Gmax), s		* 17	14.3	35.1		7.0	7.3	42.1
Max Q Clear Time (g_c+I1), s		17.0	15.7	37.1		3.9	2.7	32.6
Green Ext Time (p_c), s		0.0	0.0	0.0		0.1	0.0	9.3

Intersection Summary

HCM 2010 Ctrl Delay	43.3
HCM 2010 LOS	D

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	982	17	17	23	12	52	13	1688	14	54	1547	745
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1723		1715	1775	1615	1805	3534		1805	3574	1583
Flt Permitted	0.95	1.00		0.95	0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1723		1715	1775	1615	1805	3534		1805	3574	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1023	18	18	24	12	54	14	1758	15	56	1611	776
RTOR Reduction (vph)	0	13	0	0	0	51	0	1	0	0	0	0
Lane Group Flow (vph)	1023	23	0	18	18	3	14	1772	0	56	1611	776
Heavy Vehicles (%)	2%	0%	4%	0%	0%	0%	0%	2%	3%	0%	1%	2%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA		Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6						Free
Actuated Green, G (s)	42.7	42.7		7.0	7.0	7.0	3.1	67.3		6.3	71.0	141.2
Effective Green, g (s)	42.7	42.7		7.0	7.0	7.0	3.1	67.3		6.3	71.0	141.2
Actuated g/C Ratio	0.30	0.30		0.05	0.05	0.05	0.02	0.48		0.04	0.50	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)	1038	521		85	87	80	39	1684		80	1797	1583
v/s Ratio Prot	c0.30	0.01		0.01	0.01		0.01	c0.50		0.03	0.45	
v/s Ratio Perm						0.00						c0.49
v/c Ratio	0.99	0.04		0.21	0.21	0.03	0.36	1.05		0.70	0.90	0.49
Uniform Delay, d1	48.9	34.8		64.5	64.4	63.9	68.1	36.9		66.5	31.8	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	24.3	0.1		2.1	2.0	0.3	5.6	37.2		23.4	6.7	1.1
Delay (s)	73.3	34.9		66.6	66.5	64.2	73.6	74.2		90.0	38.5	1.1
Level of Service	E	C		E	E	E	E	E		F	D	A
Approach Delay (s)		72.0			65.1			74.2			27.8	
Approach LOS		E			E			E			C	

Intersection Summary			
HCM 2000 Control Delay	52.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	141.2	Sum of lost time (s)	17.9
Intersection Capacity Utilization	93.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	177	10	20	40	10	30	38	544	18	11	390	85
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.99	0.99		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1887	1900	1900	1800	1863	1881	1846	1900	1827	1851	1900
Adj Flow Rate, veh/h	190	11	22	43	11	32	41	585	19	12	419	91
Adj No. of Lanes	1	1	0	0	1	1	1	2	0	1	2	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	0	0	0	0	2	1	3	3	4	3	3
Cap, veh/h	624	143	286	537	105	402	574	1384	45	530	1148	247
Arrive On Green	0.26	0.26	0.26	0.26	0.26	0.26	0.40	0.40	0.40	0.40	0.40	0.40
Sat Flow, veh/h	1347	558	1117	1010	412	1568	891	3467	113	794	2874	619
Grp Volume(v), veh/h	190	0	33	54	0	32	41	296	308	12	255	255
Grp Sat Flow(s),veh/h/ln	1347	0	1675	1422	0	1568	891	1754	1825	794	1759	1735
Q Serve(g_s), s	2.9	0.0	0.3	0.0	0.0	0.4	0.8	2.8	2.8	0.3	2.4	2.4
Cycle Q Clear(g_c), s	3.5	0.0	0.3	0.5	0.0	0.4	3.2	2.8	2.8	3.1	2.4	2.4
Prop In Lane	1.00		0.67	0.80		1.00	1.00		0.06	1.00		0.36
Lane Grp Cap(c), veh/h	624	0	429	643	0	402	574	700	729	530	702	693
V/C Ratio(X)	0.30	0.00	0.08	0.08	0.00	0.08	0.07	0.42	0.42	0.02	0.36	0.37
Avail Cap(c_a), veh/h	1439	0	1443	1482	0	1351	870	1285	1337	795	1288	1270
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	8.0	0.0	6.6	6.6	0.0	6.6	6.0	5.0	5.0	6.2	4.9	4.9
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	0.0	0.2	0.3	0.0	0.2	0.2	1.3	1.4	0.1	1.2	1.2
LnGrp Delay(d),s/veh	8.1	0.0	6.6	6.6	0.0	6.6	6.1	5.2	5.2	6.2	5.0	5.0
LnGrp LOS	A		A	A		A	A	A	A	A	A	A
Approach Vol, veh/h		223			86			645			522	
Approach Delay, s/veh		7.8			6.6			5.2			5.1	
Approach LOS		A			A			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		9.9		13.3		9.9		13.3
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		20.0		17.0		20.0		17.0
Max Q Clear Time (g_c+I1), s		5.5		5.1		2.5		5.2
Green Ext Time (p_c), s		0.6		3.8		0.6		3.7

Intersection Summary	
HCM 2010 Ctrl Delay	5.6
HCM 2010 LOS	A

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	0	853	539	61	1140	835
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9	4.9	4.9	4.0
Lane Util. Factor		0.88	1.00	1.00	0.97	1.00
Frt		0.85	1.00	0.85	1.00	1.00
Flt Protected		1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		2760	1863	1509	3335	1759
Flt Permitted		1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		2760	1863	1509	3335	1759
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	927	586	66	1239	908
RTOR Reduction (vph)	0	208	0	8	0	0
Lane Group Flow (vph)	0	719	586	58	1239	908
Heavy Vehicles (%)	0%	3%	2%	7%	5%	8%
Turn Type		Over	NA	Perm	Prot	NA
Protected Phases		3	2		3	Free
Permitted Phases				2		
Actuated Green, G (s)		25.4	23.4	23.4	25.4	58.6
Effective Green, g (s)		25.4	23.4	23.4	25.4	58.6
Actuated g/C Ratio		0.43	0.40	0.40	0.43	1.00
Clearance Time (s)		4.9	4.9	4.9	4.9	
Vehicle Extension (s)		4.5	3.5	3.5	4.5	
Lane Grp Cap (vph)		1196	743	602	1445	1759
v/s Ratio Prot		0.26	c0.31		c0.37	0.52
v/s Ratio Perm				0.04		
v/c Ratio		0.60	0.79	0.10	0.86	0.52
Uniform Delay, d1		12.7	15.4	11.0	15.0	0.0
Progression Factor		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		1.1	5.7	0.1	5.6	1.1
Delay (s)		13.8	21.2	11.1	20.6	1.1
Level of Service		B	C	B	C	A
Approach Delay (s)	13.8		20.1			12.4
Approach LOS	B		C			B

Intersection Summary			
HCM 2000 Control Delay	14.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	58.6	Sum of lost time (s)	9.8
Intersection Capacity Utilization	69.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	27	773	401	468	734	5	86	5	293	10	17	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		0.95	0.95	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00	1.00		1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.98	1.00
Satd. Flow (prot)	1736	3374	1563	3467	3501		1618	1641	1524		1681	1558
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.98	1.00
Satd. Flow (perm)	1736	3374	1563	3467	3501		1618	1641	1524		1681	1558
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	31	878	456	532	834	6	98	6	333	11	19	38
RTOR Reduction (vph)	0	0	275	0	0	0	0	0	281	0	0	37
Lane Group Flow (vph)	31	878	181	532	840	0	52	52	52	0	30	1
Confl. Peds. (#/hr)	2		1			1	1			1		2
Heavy Vehicles (%)	4%	7%	2%	1%	3%	0%	6%	0%	6%	30%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Over	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	7	7	
Permitted Phases			2									7
Actuated Green, G (s)	1.8	23.4	23.4	9.2	30.9		4.3	4.3	9.2		1.5	1.5
Effective Green, g (s)	1.8	23.4	23.4	9.2	30.9		4.3	4.3	9.2		1.5	1.5
Actuated g/C Ratio	0.03	0.40	0.40	0.16	0.53		0.07	0.07	0.16		0.03	0.03
Clearance Time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Vehicle Extension (s)	1.0	1.3	1.3	1.0	1.3		1.0	1.0	1.0		1.0	1.0
Lane Grp Cap (vph)	53	1342	622	542	1839		118	120	238		42	39
v/s Ratio Prot	0.02	c0.26		c0.15	0.24		c0.03	0.03	0.03		c0.02	
v/s Ratio Perm			0.12									0.00
v/c Ratio	0.58	0.65	0.29	0.98	0.46		0.44	0.43	0.22		0.71	0.02
Uniform Delay, d1	28.1	14.4	12.1	24.7	8.7		26.1	26.1	21.7		28.4	27.9
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	10.2	0.9	0.1	33.7	0.1		1.0	0.9	0.2		38.0	0.1
Delay (s)	38.3	15.3	12.2	58.4	8.8		27.1	27.0	21.8		66.5	28.0
Level of Service	D	B	B	E	A		C	C	C		E	C
Approach Delay (s)		14.8			28.0			23.1			45.0	
Approach LOS		B			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	22.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	58.8	Sum of lost time (s)	20.4
Intersection Capacity Utilization	56.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	133	229	36	140	183	173	23	294	85	326	468	41
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1842	1900	1863	1810	1827	1759	1827	1863	1827	1821	1900
Adj Flow Rate, veh/h	145	249	39	152	199	188	25	320	92	354	509	45
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	2	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	3	3	2	5	4	8	4	2	4	4	4
Cap, veh/h	202	656	101	204	392	333	75	510	440	465	613	54
Arrive On Green	0.11	0.22	0.22	0.11	0.22	0.22	0.04	0.28	0.28	0.14	0.37	0.37
Sat Flow, veh/h	1774	3038	470	1774	1810	1535	1675	1827	1575	3375	1649	146
Grp Volume(v), veh/h	145	142	146	152	199	188	25	320	92	354	0	554
Grp Sat Flow(s),veh/h/ln	1774	1750	1758	1774	1810	1535	1675	1827	1575	1688	0	1794
Q Serve(g_s), s	5.2	4.5	4.6	5.4	6.3	7.1	0.9	10.0	2.9	6.6	0.0	18.3
Cycle Q Clear(g_c), s	5.2	4.5	4.6	5.4	6.3	7.1	0.9	10.0	2.9	6.6	0.0	18.3
Prop In Lane	1.00		0.27	1.00		1.00	1.00		1.00	1.00		0.08
Lane Grp Cap(c), veh/h	202	378	379	204	392	333	75	510	440	465	0	668
V/C Ratio(X)	0.72	0.38	0.38	0.75	0.51	0.56	0.33	0.63	0.21	0.76	0.00	0.83
Avail Cap(c_a), veh/h	253	748	751	253	773	656	205	728	627	533	0	778
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	27.9	21.9	21.9	28.0	22.5	22.8	30.2	20.6	18.0	27.1	0.0	18.6
Incr Delay (d2), s/veh	7.2	0.7	0.8	9.1	1.2	1.8	2.6	1.5	0.3	5.6	0.0	6.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	2.2	2.3	3.2	3.3	3.2	0.5	5.2	1.3	3.4	0.0	10.2
LnGrp Delay(d),s/veh	35.1	22.6	22.7	37.0	23.7	24.6	32.8	22.1	18.3	32.7	0.0	25.5
LnGrp LOS	D	C	C	D	C	C	C	C	B	C		C
Approach Vol, veh/h		433			539			437			908	
Approach Delay, s/veh		26.8			27.8			21.9			28.3	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.2	18.3	6.6	29.2	11.1	18.4	12.7	23.1
Change Period (Y+Rc), s	3.7	* 4.2	3.7	4.9	3.7	* 4.2	3.7	4.9
Max Green Setting (Gmax), s	9.3	* 28	8.0	28.3	9.3	* 28	10.3	26.0
Max Q Clear Time (g_c+I1), s	7.4	6.6	2.9	20.3	7.2	9.1	8.6	12.0
Green Ext Time (p_c), s	0.1	4.5	0.0	3.8	0.1	4.3	0.2	5.5

Intersection Summary		
HCM 2010 Ctrl Delay		26.7
HCM 2010 LOS		C

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	93	388	83	115	276	20	140	4	85	15	3	31
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1860	1900	1810	1799	1900	1810	1704	1900	1900	1900	1900
Adj Flow Rate, veh/h	102	426	91	126	303	22	154	4	93	16	3	34
Adj No. of Lanes	1	2	0	1	2	0	2	1	0	1	1	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	0	2	2	5	6	6	5	0	0	0	0	0
Cap, veh/h	131	1618	343	158	1865	135	252	11	261	174	7	81
Arrive On Green	0.07	0.56	0.56	0.09	0.58	0.58	0.08	0.19	0.19	0.05	0.05	0.05
Sat Flow, veh/h	1810	2901	615	1723	3233	233	3343	60	1397	1319	133	1502
Grp Volume(v), veh/h	102	258	259	126	159	166	154	0	97	16	0	37
Grp Sat Flow(s),veh/h/ln	1810	1767	1749	1723	1709	1757	1672	0	1457	1319	0	1635
Q Serve(g_s), s	3.9	5.3	5.4	5.0	3.0	3.1	3.1	0.0	4.1	0.8	0.0	1.5
Cycle Q Clear(g_c), s	3.9	5.3	5.4	5.0	3.0	3.1	3.1	0.0	4.1	0.8	0.0	1.5
Prop In Lane	1.00		0.35	1.00		0.13	1.00		0.96	1.00		0.92
Lane Grp Cap(c), veh/h	131	985	975	158	986	1014	252	0	272	174	0	88
V/C Ratio(X)	0.78	0.26	0.27	0.80	0.16	0.16	0.61	0.00	0.36	0.09	0.00	0.42
Avail Cap(c_a), veh/h	142	985	975	160	986	1014	764	0	333	404	0	374
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.85	0.85	0.85	0.99	0.99	0.99	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	31.9	8.0	8.0	31.2	6.9	6.9	31.4	0.0	24.8	31.7	0.0	32.0
Incr Delay (d2), s/veh	16.8	0.5	0.6	22.0	0.3	0.3	0.9	0.0	0.3	0.2	0.0	3.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.5	2.7	2.7	3.3	1.5	1.6	1.5	0.0	1.6	0.3	0.0	0.8
LnGrp Delay(d),s/veh	48.7	8.6	8.6	53.1	7.3	7.3	32.3	0.0	25.1	31.9	0.0	35.2
LnGrp LOS	D	A	A	D	A	A	C		C	C		D
Approach Vol, veh/h		619			451			251			53	
Approach Delay, s/veh		15.2			20.1			29.5			34.2	
Approach LOS		B			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6		8
Phs Duration (G+Y+Rc), s	9.9	43.0	9.3	7.8	8.6	44.4		17.1
Change Period (Y+Rc), s	3.5	4.0	4.0	4.0	3.5	4.0		4.0
Max Green Setting (Gmax), s	6.5	16.0	16.0	16.0	5.5	17.0		16.0
Max Q Clear Time (g_c+I1), s	7.0	7.4	5.1	3.5	5.9	5.1		6.1
Green Ext Time (p_c), s	0.0	2.5	0.2	0.4	0.0	3.0		0.4

Intersection Summary		
HCM 2010 Ctrl Delay		20.1
HCM 2010 LOS		C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	396	92	61	379	1	32	0	38	0	0	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	0.99		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1820	1900	1845	1845	1900	1900	1638	1712	1900	1900	1900
Adj Flow Rate, veh/h	0	477	111	73	457	1	39	0	46	0	0	0
Adj No. of Lanes	0	2	0	1	2	0	0	1	1	0	1	0
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	0	4	4	3	3	3	0	0	11	0	0	0
Cap, veh/h	0	1849	428	91	2815	6	212	0	80	0	105	0
Arrive On Green	0.00	0.66	0.66	0.05	0.78	0.78	0.06	0.00	0.06	0.00	0.00	0.00
Sat Flow, veh/h	0	2880	645	1757	3588	8	1228	0	1444	0	1900	0
Grp Volume(v), veh/h	0	295	293	73	223	235	39	0	46	0	0	0
Grp Sat Flow(s),veh/h/ln	0	1729	1705	1757	1753	1843	1228	0	1444	0	1900	0
Q Serve(g_s), s	0.0	3.5	3.5	2.1	1.6	1.6	1.5	0.0	1.6	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	3.5	3.5	2.1	1.6	1.6	1.5	0.0	1.6	0.0	0.0	0.0
Prop In Lane	0.00		0.38	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	0	1146	1130	91	1375	1446	212	0	80	0	105	0
V/C Ratio(X)	0.00	0.26	0.26	0.80	0.16	0.16	0.18	0.00	0.57	0.00	0.00	0.00
Avail Cap(c_a), veh/h	0	1146	1130	193	1375	1446	537	0	462	0	608	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.97	0.97	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	3.4	3.4	23.5	1.3	1.3	23.0	0.0	23.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.5	0.5	6.1	0.3	0.2	0.2	0.0	2.4	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.8	1.8	1.1	0.8	0.9	0.5	0.0	0.7	0.0	0.0	0.0
LnGrp Delay(d),s/veh	0.0	3.9	4.0	29.5	1.6	1.6	23.2	0.0	25.4	0.0	0.0	0.0
LnGrp LOS		A	A	C	A	A	C		C			
Approach Vol, veh/h		588			531			85			0	
Approach Delay, s/veh		4.0			5.4			24.4			0.0	
Approach LOS		A			A			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	6.1	37.1		6.8		43.2		6.8
Change Period (Y+Rc), s	3.5	4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s	5.5	17.0		16.0		26.0		16.0
Max Q Clear Time (g_c+I1), s	4.1	5.5		0.0		3.6		3.6
Green Ext Time (p_c), s	0.0	5.5		0.0		8.0		0.1

Intersection Summary		
HCM 2010 Ctrl Delay		6.0
HCM 2010 LOS		A

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	249	0	16	0	1	0	17	14	0	0	32	369
Conflicting Peds, #/hr	2	0	2	0	0	0	2	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	210	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	1	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	92	80	92	92	92	80	80	92	92	80	80
Heavy Vehicles, %	7	0	0	2	2	2	0	7	0	0	0	2
Mvmt Flow	311	0	20	0	1	0	21	18	0	0	40	461

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	3	0	0	2	0	0	25	628	2	14	628	5
Stage 1	-	-	-	-	-	-	2	625	-	3	3	-
Stage 2	-	-	-	-	-	-	23	3	-	11	625	-
Critical Hdwy	4.17	-	-	-	-	-	7.1	6.57	-	7.1	6.5	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.57	-	-	-	-
Follow-up Hdwy	2.263	-	-	-	-	-	3.5	4.063	-	3.5	4	3.318
Pot Cap-1 Maneuver	1587	-	-	-	-	-	991	393	-	1007	402	1078
Stage 1	-	-	-	-	-	-	-	-	-	1025	897	-
Stage 2	-	-	-	-	-	-	1000	883	-	-	-	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1584	-	-	-	-	-	515	315	-	-	322	1074
Mov Cap-2 Maneuver	-	-	-	-	-	-	304	1518	-	-	~ -380	-
Stage 1	-	-	-	-	-	-	-	-	-	822	896	-
Stage 2	-	-	-	-	-	-	544	882	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	7.4	0		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	304	-	1584	-	-	-	-	-	-	1074
HCM Lane V/C Ratio	0.07	-	0.196	-	-	-	-	-	-	0.429
HCM Control Delay (s)	17.7	-	7.8	-	-	0	-	-	-	10.9
HCM Lane LOS	C	-	A	-	-	A	-	-	-	B
HCM 95th %tile Q(veh)	0.2	-	0.7	-	-	-	-	-	-	2.2

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	213	40	129	134	38	50	159	1172	37	16	1633	137
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.94	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1868	1900	1900	1842	1900	1827	1840	1900	1357	1827	1845
Adj Flow Rate, veh/h	220	82	148	128	81	57	183	1347	43	18	1877	0
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	3	0	0	0	9	9	4	3	3	40	4	3
Cap, veh/h	293	98	177	151	81	57	163	1832	58	37	1614	729
Arrive On Green	0.17	0.17	0.17	0.08	0.08	0.08	0.09	0.53	0.53	0.03	0.46	0.00
Sat Flow, veh/h	1757	586	1057	1810	977	688	1740	3456	110	1293	3471	1568
Grp Volume(v), veh/h	220	0	230	128	0	138	183	681	709	18	1877	0
Grp Sat Flow(s),veh/h/ln	1757	0	1643	1810	0	1665	1740	1748	1818	1293	1736	1568
Q Serve(g_s), s	10.6	0.0	12.0	6.2	0.0	7.4	8.3	26.6	26.7	1.2	41.3	0.0
Cycle Q Clear(g_c), s	10.6	0.0	12.0	6.2	0.0	7.4	8.3	26.6	26.7	1.2	41.3	0.0
Prop In Lane	1.00		0.64	1.00		0.41	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	293	0	274	151	0	139	163	927	964	37	1614	729
V/C Ratio(X)	0.75	0.00	0.84	0.85	0.00	1.00	1.13	0.73	0.74	0.49	1.16	0.00
Avail Cap(c_a), veh/h	316	0	296	151	0	139	163	927	964	106	1614	729
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	35.2	0.0	35.8	40.2	0.0	40.7	40.3	16.1	16.1	42.5	23.8	0.0
Incr Delay (d2), s/veh	9.3	0.0	18.2	35.1	0.0	74.9	108.4	3.5	3.4	9.9	80.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.9	0.0	6.8	4.6	0.0	6.2	8.8	13.6	14.1	0.5	37.6	0.0
LnGrp Delay(d),s/veh	44.6	0.0	54.1	75.3	0.0	115.6	148.6	19.5	19.5	52.5	104.4	0.0
LnGrp LOS	D		D	E		F	F	B	B	D	F	
Approach Vol, veh/h		450			266			1573			1895	
Approach Delay, s/veh		49.4			96.2			34.5			103.9	
Approach LOS		D			F			C			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		19.0	12.0	46.2		11.6	6.2	52.0
Change Period (Y+Rc), s		* 4.2	3.7	4.9		4.2	3.7	4.9
Max Green Setting (Gmax), s		* 16	8.3	41.3		7.4	7.3	42.3
Max Q Clear Time (g_c+I1), s		14.0	10.3	43.3		9.4	3.2	28.7
Green Ext Time (p_c), s		0.5	0.0	0.0		0.0	0.0	13.4

Intersection Summary	
HCM 2010 Ctrl Delay	71.5
HCM 2010 LOS	E

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	402	5	17	18	14	49	19	1410	10	32	1774	702
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.88		1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.99	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1681		1665	1782	1572	1736	3532		1770	3438	1538
Flt Permitted	0.95	1.00		0.95	0.99	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1681		1665	1782	1572	1736	3532		1770	3438	1538
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	467	6	20	21	16	57	22	1640	12	37	2063	816
RTOR Reduction (vph)	0	17	0	0	0	54	0	0	0	0	0	0
Lane Group Flow (vph)	467	9	0	18	19	3	22	1652	0	37	2063	816
Confl. Peds. (#/hr)				1		1			1	1		
Heavy Vehicles (%)	2%	0%	0%	3%	0%	1%	4%	2%	13%	2%	5%	5%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA		Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6						Free
Actuated Green, G (s)	18.9	18.9		6.8	6.8	6.8	4.5	69.7		4.5	70.2	117.8
Effective Green, g (s)	18.9	18.9		6.8	6.8	6.8	4.5	69.7		4.5	70.2	117.8
Actuated g/C Ratio	0.16	0.16		0.06	0.06	0.06	0.04	0.59		0.04	0.60	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)	550	269		96	102	90	66	2089		67	2048	1538
v/s Ratio Prot	c0.14	0.01		0.01	0.01		0.01	0.47		0.02	c0.60	
v/s Ratio Perm						0.00						c0.53
v/c Ratio	0.85	0.03		0.19	0.19	0.04	0.33	0.79		0.55	1.01	0.53
Uniform Delay, d1	48.1	41.7		52.9	52.9	52.4	55.2	18.5		55.7	23.8	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	12.6	0.1		1.6	1.5	0.3	3.0	2.4		9.5	21.7	1.3
Delay (s)	60.6	41.8		54.5	54.4	52.7	58.2	20.9		65.2	45.5	1.3
Level of Service	E	D		D	D	D	E	C		E	D	A
Approach Delay (s)		59.6			53.4			21.4			33.4	
Approach LOS		E			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	32.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	117.8	Sum of lost time (s)	17.9
Intersection Capacity Utilization	75.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM 2010 Signalized Intersection Summary
9: Carmel Rancho Blvd & Shopping Center Dwy

Cum + Proj Alt 2 AM.syn
3/14/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	56	1	19	9	1	20	17	231	15	76	561	174
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		1.00	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1882	1900	1900	1785	1863	1881	1848	1900	1827	1853	1900
Adj Flow Rate, veh/h	73	1	25	12	1	26	22	300	19	99	729	226
Adj No. of Lanes	1	1	0	0	1	1	1	2	0	1	2	0
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Percent Heavy Veh, %	0	0	0	0	0	2	1	3	3	4	3	3
Cap, veh/h	475	7	179	447	24	183	527	1720	108	814	1356	420
Arrive On Green	0.12	0.12	0.12	0.12	0.12	0.12	0.51	0.51	0.51	0.51	0.51	0.51
Sat Flow, veh/h	1392	62	1545	1086	205	1573	591	3354	211	1034	2644	820
Grp Volume(v), veh/h	73	0	26	13	0	26	22	156	163	99	485	470
Grp Sat Flow(s),veh/h/ln	1392	0	1606	1291	0	1573	591	1755	1810	1034	1761	1704
Q Serve(g_s), s	1.1	0.0	0.3	0.0	0.0	0.3	0.6	1.0	1.0	1.2	4.0	4.0
Cycle Q Clear(g_c), s	1.4	0.0	0.3	0.3	0.0	0.3	4.6	1.0	1.0	2.3	4.0	4.0
Prop In Lane	1.00		0.96	0.92		1.00	1.00		0.12	1.00		0.48
Lane Grp Cap(c), veh/h	475	0	187	471	0	183	527	900	928	814	903	874
V/C Ratio(X)	0.15	0.00	0.14	0.03	0.00	0.14	0.04	0.17	0.18	0.12	0.54	0.54
Avail Cap(c_a), veh/h	1605	0	1491	1563	0	1460	690	1385	1427	1099	1389	1344
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	9.2	0.0	8.6	8.5	0.0	8.6	5.1	2.8	2.8	3.4	3.5	3.5
Incr Delay (d2), s/veh	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.1	0.1	0.0	0.1	0.1	0.5	0.5	0.3	1.9	1.9
LnGrp Delay(d),s/veh	9.2	0.0	8.7	8.5	0.0	8.7	5.1	2.8	2.8	3.4	3.7	3.7
LnGrp LOS	A		A	A		A	A	A	A	A	A	A
Approach Vol, veh/h		99			39			341			1054	
Approach Delay, s/veh		9.1			8.6			3.0			3.7	
Approach LOS		A			A			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		6.5		15.1		6.5		15.1
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		20.0		17.0		20.0		17.0
Max Q Clear Time (g_c+I1), s		3.4		6.0		2.3		6.6
Green Ext Time (p_c), s		0.2		4.5		0.2		4.4

Intersection Summary	
HCM 2010 Ctrl Delay	4.0
HCM 2010 LOS	A

HCM Signalized Intersection Capacity Analysis
1: SR 1 & Carmel Valley Rd

Cum + Proj Alt 2 PM.syn
3/14/2016

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	0	968	974	105	993	770
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9	4.9	4.9	4.0
Lane Util. Factor		0.88	1.00	1.00	0.97	1.00
Frt		0.85	1.00	0.85	1.00	1.00
Flt Protected		1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		2814	1863	1553	3467	1881
Flt Permitted		1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		2814	1863	1553	3467	1881
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	1030	1036	112	1056	819
RTOR Reduction (vph)	0	104	0	5	0	0
Lane Group Flow (vph)	0	926	1036	107	1056	819
Heavy Vehicles (%)	0%	1%	2%	4%	1%	1%
Turn Type		Over	NA	Perm	Prot	NA
Protected Phases		3	2		3	Free
Permitted Phases				2		
Actuated Green, G (s)		20.1	35.1	35.1	20.1	65.0
Effective Green, g (s)		20.1	35.1	35.1	20.1	65.0
Actuated g/C Ratio		0.31	0.54	0.54	0.31	1.00
Clearance Time (s)		4.9	4.9	4.9	4.9	
Vehicle Extension (s)		4.5	3.5	3.5	4.5	
Lane Grp Cap (vph)		870	1006	838	1072	1881
v/s Ratio Prot		c0.33	c0.56		0.30	0.44
v/s Ratio Perm				0.07		
v/c Ratio		1.06	1.03	0.13	0.99	0.44
Uniform Delay, d1		22.4	14.9	7.4	22.3	0.0
Progression Factor		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		49.3	36.3	0.1	23.8	0.7
Delay (s)		71.7	51.2	7.5	46.1	0.7
Level of Service		E	D	A	D	A
Approach Delay (s)	71.7		47.0			26.3
Approach LOS	E		D			C

Intersection Summary			
HCM 2000 Control Delay	43.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	9.8
Intersection Capacity Utilization	93.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	874	193	400	673	4	277	17	601	4	23	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		0.95	0.95	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	1.00
Satd. Flow (prot)	1805	3539	1615	3467	3571		1715	1728	1599		1887	1553
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.99	1.00
Satd. Flow (perm)	1805	3539	1615	3467	3571		1715	1728	1599		1887	1553
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	33	930	205	426	716	4	295	18	639	4	24	19
RTOR Reduction (vph)	0	0	121	0	1	0	0	0	536	0	0	19
Lane Group Flow (vph)	33	930	84	426	719	0	156	157	103	0	28	0
Heavy Vehicles (%)	0%	2%	0%	1%	1%	0%	0%	0%	1%	0%	0%	4%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Over	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	7	7	
Permitted Phases			2									7
Actuated Green, G (s)	1.9	23.9	23.9	9.0	31.1		9.2	9.2	9.0		1.6	1.6
Effective Green, g (s)	1.9	23.9	23.9	9.0	31.1		9.2	9.2	9.0		1.6	1.6
Actuated g/C Ratio	0.03	0.37	0.37	0.14	0.49		0.14	0.14	0.14		0.02	0.02
Clearance Time (s)	4.5	5.0	5.0	4.6	5.0		5.8	5.8	4.6		5.0	5.0
Vehicle Extension (s)	1.0	1.3	1.3	1.0	1.3		1.0	1.0	1.0		1.0	1.0
Lane Grp Cap (vph)	53	1319	602	486	1732		246	248	224		47	38
v/s Ratio Prot	0.02	c0.26		c0.12	0.20		c0.09	0.09	0.06		c0.01	
v/s Ratio Perm			0.05									0.00
v/c Ratio	0.62	0.71	0.14	0.88	0.42		0.63	0.63	0.46		0.60	0.01
Uniform Delay, d1	30.7	17.1	13.3	27.0	10.6		25.9	25.9	25.3		30.9	30.5
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	15.2	1.4	0.0	15.7	0.1		3.9	3.8	0.5		12.8	0.0
Delay (s)	46.0	18.5	13.3	42.7	10.7		29.8	29.7	25.9		43.7	30.5
Level of Service	D	B	B	D	B		C	C	C		D	C
Approach Delay (s)		18.4			22.6			27.1			38.4	
Approach LOS		B			C			C			D	

Intersection Summary				
HCM 2000 Control Delay	22.6	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.72			
Actuated Cycle Length (s)	64.1	Sum of lost time (s)	20.4	
Intersection Capacity Utilization	76.9%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	143	367	83	190	418	355	162	581	164	329	397	44
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1878	1900	1881	1881	1863	1881	1845	1863	1881	1883	1900
Adj Flow Rate, veh/h	146	374	85	194	427	362	165	593	167	336	405	45
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	2	1	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	1	1	1	1	2	1	3	2	1	1	1
Cap, veh/h	164	865	195	205	604	504	198	553	473	359	487	54
Arrive On Green	0.09	0.30	0.30	0.11	0.32	0.32	0.11	0.30	0.30	0.10	0.29	0.29
Sat Flow, veh/h	1774	2896	651	1792	1881	1571	1792	1845	1575	3476	1664	185
Grp Volume(v), veh/h	146	229	230	194	427	362	165	593	167	336	0	450
Grp Sat Flow(s),veh/h/ln	1774	1784	1763	1792	1881	1571	1792	1845	1575	1738	0	1849
Q Serve(g_s), s	7.3	9.3	9.5	9.7	17.9	18.3	8.1	27.0	7.5	8.6	0.0	20.5
Cycle Q Clear(g_c), s	7.3	9.3	9.5	9.7	17.9	18.3	8.1	27.0	7.5	8.6	0.0	20.5
Prop In Lane	1.00		0.37	1.00		1.00	1.00		1.00	1.00		0.10
Lane Grp Cap(c), veh/h	164	533	527	205	604	504	198	553	473	359	0	541
V/C Ratio(X)	0.89	0.43	0.44	0.95	0.71	0.72	0.83	1.07	0.35	0.94	0.00	0.83
Avail Cap(c_a), veh/h	164	533	527	205	604	504	205	553	473	359	0	541
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	40.4	25.4	25.4	39.6	26.8	27.0	39.2	31.5	24.7	40.1	0.0	29.8
Incr Delay (d2), s/veh	41.0	0.7	0.7	47.6	6.8	8.5	23.7	58.9	0.5	31.4	0.0	10.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.4	4.7	4.7	7.5	10.4	9.0	5.3	22.7	3.3	5.7	0.0	12.0
LnGrp Delay(d),s/veh	81.5	26.0	26.1	87.2	33.7	35.4	62.9	90.4	25.2	71.4	0.0	40.6
LnGrp LOS	F	C	C	F	C	D	E	F	C	E		D
Approach Vol, veh/h		605			983			925			786	
Approach Delay, s/veh		39.4			44.9			73.7			53.8	
Approach LOS		D			D			E			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.0	31.1	13.7	31.2	12.0	33.1	13.0	31.9
Change Period (Y+Rc), s	3.7	* 4.2	3.7	4.9	3.7	* 4.2	3.7	4.9
Max Green Setting (Gmax), s	10.3	* 27	10.3	26.0	8.3	* 29	9.3	27.0
Max Q Clear Time (g_c+I1), s	11.7	11.5	10.1	22.5	9.3	20.3	10.6	29.0
Green Ext Time (p_c), s	0.0	7.6	0.0	2.3	0.0	5.1	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	54.1
HCM 2010 LOS	D

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	177	461	138	163	455	47	348	9	169	43	8	86
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1867	1900	1881	1883	1900	1881	1865	1900	1900	1900	1900
Adj Flow Rate, veh/h	179	466	139	165	460	47	352	9	171	43	8	87
Adj No. of Lanes	1	2	0	1	2	0	2	1	0	1	1	0
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	0	2	2	1	1	1	1	0	0	0	0	0
Cap, veh/h	168	1232	365	166	1498	152	461	23	434	221	13	142
Arrive On Green	0.09	0.46	0.46	0.09	0.46	0.46	0.13	0.29	0.29	0.10	0.10	0.10
Sat Flow, veh/h	1810	2697	799	1792	3278	334	3476	80	1517	1223	136	1481
Grp Volume(v), veh/h	179	305	300	165	250	257	352	0	180	43	0	95
Grp Sat Flow(s),veh/h/ln	1810	1774	1722	1792	1789	1822	1738	0	1597	1223	0	1617
Q Serve(g_s), s	6.5	7.9	8.0	6.4	6.2	6.2	6.8	0.0	6.4	2.3	0.0	3.9
Cycle Q Clear(g_c), s	6.5	7.9	8.0	6.4	6.2	6.2	6.8	0.0	6.4	2.3	0.0	3.9
Prop In Lane	1.00		0.46	1.00		0.18	1.00		0.95	1.00		0.92
Lane Grp Cap(c), veh/h	168	810	787	166	817	833	461	0	457	221	0	156
V/C Ratio(X)	1.07	0.38	0.38	0.99	0.31	0.31	0.76	0.00	0.39	0.19	0.00	0.61
Avail Cap(c_a), veh/h	168	810	787	166	817	833	794	0	457	382	0	370
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.78	0.78	0.78	0.98	0.98	0.98	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	31.8	12.5	12.5	31.7	12.0	12.0	29.3	0.0	20.1	29.6	0.0	30.4
Incr Delay (d2), s/veh	79.8	1.0	1.1	66.6	1.0	0.9	1.0	0.0	0.2	0.4	0.0	3.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.9	4.1	4.0	6.2	3.3	3.4	3.3	0.0	2.8	0.8	0.0	1.9
LnGrp Delay(d),s/veh	111.6	13.5	13.6	98.3	13.0	13.0	30.3	0.0	20.3	30.1	0.0	34.2
LnGrp LOS	F	B	B	F	B	B	C		C	C		C
Approach Vol, veh/h		784			672			532			138	
Approach Delay, s/veh		35.9			33.9			26.9			32.9	
Approach LOS		D			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6		8
Phs Duration (G+Y+Rc), s	10.0	36.0	13.3	10.7	10.0	36.0		24.0
Change Period (Y+Rc), s	3.5	4.0	4.0	4.0	3.5	4.0		4.0
Max Green Setting (Gmax), s	6.5	16.0	16.0	16.0	6.5	16.0		16.0
Max Q Clear Time (g_c+I1), s	8.4	10.0	8.8	5.9	8.5	8.2		8.4
Green Ext Time (p_c), s	0.0	2.6	0.4	0.5	0.0	3.1		0.9

Intersection Summary	
HCM 2010 Ctrl Delay	32.8
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	619	54	85	579	0	86	0	110	0	0	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1900	1863	1881	1900	1900	1881	1900	1900	1900	1900
Adj Flow Rate, veh/h	0	638	56	88	597	0	89	0	113	0	0	0
Adj No. of Lanes	0	2	0	1	2	0	0	1	1	0	1	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	0	2	2	2	1	1	0	0	0	0	0	0
Cap, veh/h	0	1975	173	111	2619	0	297	0	173	0	204	0
Arrive On Green	0.00	0.60	0.60	0.06	0.73	0.00	0.11	0.00	0.11	0.00	0.00	0.00
Sat Flow, veh/h	0	3386	289	1774	3668	0	1422	0	1610	0	1900	0
Grp Volume(v), veh/h	0	343	351	88	597	0	89	0	113	0	0	0
Grp Sat Flow(s),veh/h/ln	0	1770	1812	1774	1787	0	1422	0	1610	0	1900	0
Q Serve(g_s), s	0.0	4.8	4.8	2.4	2.7	0.0	3.0	0.0	3.4	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	4.8	4.8	2.4	2.7	0.0	3.0	0.0	3.4	0.0	0.0	0.0
Prop In Lane	0.00		0.16	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	0	1062	1087	111	2619	0	297	0	173	0	204	0
V/C Ratio(X)	0.00	0.32	0.32	0.79	0.23	0.00	0.30	0.00	0.65	0.00	0.00	0.00
Avail Cap(c_a), veh/h	0	1062	1087	231	2619	0	599	0	515	0	608	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.88	0.88	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	5.0	5.0	23.1	2.1	0.0	21.3	0.0	21.4	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.7	0.7	4.6	0.2	0.0	0.2	0.0	1.6	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	2.5	2.6	1.3	1.3	0.0	1.2	0.0	1.6	0.0	0.0	0.0
LnGrp Delay(d),s/veh	0.0	5.7	5.7	27.7	2.3	0.0	21.5	0.0	23.0	0.0	0.0	0.0
LnGrp LOS		A	A	C	A		C		C			
Approach Vol, veh/h		694			685			202			0	
Approach Delay, s/veh		5.7			5.6			22.3			0.0	
Approach LOS		A			A			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	6.6	34.0		9.4		40.6		9.4
Change Period (Y+Rc), s	3.5	4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s	6.5	16.0		16.0		26.0		16.0
Max Q Clear Time (g_c+I1), s	4.4	6.8		0.0		4.7		5.4
Green Ext Time (p_c), s	0.0	5.9		0.0		10.4		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	7.8
HCM 2010 LOS	A

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	496	0	64	0	1	0	33	25	0	0	22	506
Conflicting Peds, #/hr	0	0	0	0	0	0	2	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	210	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	92	91	92	92	92	91	91	92	92	91	91
Heavy Vehicles, %	2	0	0	0	0	0	4	0	0	0	0	1
Mvmt Flow	545	0	70	0	1	0	36	27	0	0	24	556

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	2	0	0	15	1093	2	17	1093	1
Stage 1	-	-	-	-	-	-	2	1092	-	1	1	-
Stage 2	-	-	-	-	-	-	13	1	-	16	1092	-
Critical Hdwy	4.12	-	-	-	-	-	7.14	6.5	-	7.1	6.5	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.14	5.5	-	-	-	-
Follow-up Hdwy	2.218	-	-	-	-	-	3.536	4	-	3.5	4	3.309
Pot Cap-1 Maneuver	1622	-	-	-	-	-	996	216	-	1003	216	1087
Stage 1	-	-	-	-	-	-	-	-	-	1027	899	-
Stage 2	-	-	-	-	-	-	1002	899	-	-	-	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1622	-	-	-	-	-	547	143	-	-	143	1087
Mov Cap-2 Maneuver	-	-	-	-	-	-	235	~ -283	-	-	~ -32	-
Stage 1	-	-	-	-	-	-	-	-	-	682	899	-
Stage 2	-	-	-	-	-	-	476	899	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	7.4	0		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	235	-	1622	-	-	-	-	-	-	1087
HCM Lane V/C Ratio	0.154	-	0.336	-	-	-	-	-	-	0.512
HCM Control Delay (s)	23.1	-	8.3	-	-	0	-	-	-	11.7
HCM Lane LOS	C	-	A	-	-	A	-	-	-	B
HCM 95th %tile Q(veh)	0.5	-	1.5	-	-	-	-	-	-	3

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	277	22	232	34	13	18	285	1658	10	13	1546	153
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.96	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1871	1900	1863	1763	1900	1900	1845	1900	1900	1881	1881
Adj Flow Rate, veh/h	280	40	244	34	16	19	300	1745	11	14	1627	0
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	7	7	2	5	5	0	3	3	0	1	1
Cap, veh/h	332	42	257	114	46	55	292	1906	12	42	1414	633
Arrive On Green	0.19	0.19	0.19	0.06	0.06	0.06	0.16	0.53	0.53	0.02	0.40	0.00
Sat Flow, veh/h	1774	225	1374	1774	717	852	1810	3571	22	1810	3574	1599
Grp Volume(v), veh/h	280	0	284	34	0	35	300	856	900	14	1627	0
Grp Sat Flow(s),veh/h/ln	1774	0	1599	1774	0	1569	1810	1753	1841	1810	1787	1599
Q Serve(g_s), s	13.5	0.0	15.6	1.6	0.0	1.9	14.3	39.5	39.6	0.7	35.1	0.0
Cycle Q Clear(g_c), s	13.5	0.0	15.6	1.6	0.0	1.9	14.3	39.5	39.6	0.7	35.1	0.0
Prop In Lane	1.00		0.86	1.00		0.54	1.00		0.01	1.00		1.00
Lane Grp Cap(c), veh/h	332	0	299	114	0	101	292	936	983	42	1414	633
V/C Ratio(X)	0.84	0.00	0.95	0.30	0.00	0.35	1.03	0.91	0.92	0.34	1.15	0.00
Avail Cap(c_a), veh/h	332	0	299	140	0	124	292	936	983	149	1414	633
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	34.8	0.0	35.6	39.6	0.0	39.7	37.2	18.8	18.9	42.7	26.8	0.0
Incr Delay (d2), s/veh	17.9	0.0	38.6	2.0	0.0	2.9	60.3	13.6	13.2	4.7	76.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.3	0.0	10.1	0.9	0.0	0.9	11.9	22.3	23.6	0.4	32.1	0.0
LnGrp Delay(d),s/veh	52.7	0.0	74.3	41.6	0.0	42.6	97.5	32.5	32.1	47.3	103.2	0.0
LnGrp LOS	D		E	D		D	F	C	C	D	F	
Approach Vol, veh/h		564			69			2056			1641	
Approach Delay, s/veh		63.6			42.1			41.8			102.7	
Approach LOS		E			D			D			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.8	18.0	40.0		9.9	5.7	52.3
Change Period (Y+Rc), s		* 4.2	3.7	4.9		4.2	3.7	4.9
Max Green Setting (Gmax), s		* 17	14.3	35.1		7.0	7.3	42.1
Max Q Clear Time (g_c+I1), s		17.6	16.3	37.1		3.9	2.7	41.6
Green Ext Time (p_c), s		0.0	0.0	0.0		0.1	0.0	0.5

Intersection Summary	
HCM 2010 Ctrl Delay	67.7
HCM 2010 LOS	E

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	982	17	17	23	12	52	13	1906	14	54	1737	745
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1723		1715	1775	1615	1805	3535		1805	3574	1583
Flt Permitted	0.95	1.00		0.95	0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1723		1715	1775	1615	1805	3535		1805	3574	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1023	18	18	24	12	54	14	1985	15	56	1809	776
RTOR Reduction (vph)	0	13	0	0	0	51	0	1	0	0	0	0
Lane Group Flow (vph)	1023	23	0	18	18	3	14	1999	0	56	1809	776
Heavy Vehicles (%)	2%	0%	4%	0%	0%	0%	0%	2%	3%	0%	1%	2%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA		Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6						Free
Actuated Green, G (s)	42.7	42.7		7.0	7.0	7.0	3.1	67.3		6.3	71.0	141.2
Effective Green, g (s)	42.7	42.7		7.0	7.0	7.0	3.1	67.3		6.3	71.0	141.2
Actuated g/C Ratio	0.30	0.30		0.05	0.05	0.05	0.02	0.48		0.04	0.50	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9		4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)	1038	521		85	87	80	39	1684		80	1797	1583
v/s Ratio Prot	c0.30	0.01		0.01	0.01		0.01	c0.57		0.03	0.51	
v/s Ratio Perm						0.00						c0.49
v/c Ratio	0.99	0.04		0.21	0.21	0.03	0.36	1.19		0.70	1.01	0.49
Uniform Delay, d1	48.9	34.8		64.5	64.4	63.9	68.1	36.9		66.5	35.1	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	24.3	0.1		2.1	2.0	0.3	5.6	90.6		23.4	22.9	1.1
Delay (s)	73.3	34.9		66.6	66.5	64.2	73.6	127.6		90.0	58.0	1.1
Level of Service	E	C		E	E	E	E	F		F	E	A
Approach Delay (s)		72.0			65.1			127.2			41.9	
Approach LOS		E			E			F			D	

Intersection Summary				
HCM 2000 Control Delay	77.4	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	1.08			
Actuated Cycle Length (s)	141.2	Sum of lost time (s)	17.9	
Intersection Capacity Utilization	99.2%	ICU Level of Service	F	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	183	10	20	40	10	30	38	605	18	11	455	89
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.99	0.99		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1887	1900	1900	1800	1863	1881	1846	1900	1827	1851	1900
Adj Flow Rate, veh/h	197	11	22	43	11	32	41	651	19	12	489	96
Adj No. of Lanes	1	1	0	0	1	1	1	2	0	1	2	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	0	0	0	0	2	1	3	3	4	3	3
Cap, veh/h	610	145	290	526	105	407	540	1447	42	502	1218	238
Arrive On Green	0.26	0.26	0.26	0.26	0.26	0.26	0.42	0.42	0.42	0.42	0.42	0.42
Sat Flow, veh/h	1347	558	1117	1016	403	1569	832	3480	102	747	2929	572
Grp Volume(v), veh/h	197	0	33	54	0	32	41	328	342	12	292	293
Grp Sat Flow(s),veh/h/ln	1347	0	1675	1419	0	1569	832	1754	1827	747	1758	1743
Q Serve(g_s), s	3.2	0.0	0.4	0.1	0.0	0.4	0.9	3.3	3.3	0.3	2.9	2.9
Cycle Q Clear(g_c), s	3.8	0.0	0.4	0.6	0.0	0.4	3.8	3.3	3.3	3.6	2.9	2.9
Prop In Lane	1.00		0.67	0.80		1.00	1.00		0.06	1.00		0.33
Lane Grp Cap(c), veh/h	610	0	435	631	0	407	540	729	760	502	731	725
V/C Ratio(X)	0.32	0.00	0.08	0.09	0.00	0.08	0.08	0.45	0.45	0.02	0.40	0.40
Avail Cap(c_a), veh/h	1353	0	1359	1396	0	1273	768	1210	1260	707	1213	1202
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	8.4	0.0	6.9	7.0	0.0	6.9	6.4	5.2	5.2	6.5	5.0	5.1
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	0.0	0.2	0.3	0.0	0.2	0.2	1.6	1.6	0.1	1.4	1.4
LnGrp Delay(d),s/veh	8.5	0.0	6.9	7.0	0.0	6.9	6.4	5.3	5.3	6.5	5.2	5.2
LnGrp LOS	A		A	A		A	A	A	A	A	A	A
Approach Vol, veh/h		230			86			711			597	
Approach Delay, s/veh		8.3			7.0			5.4			5.2	
Approach LOS		A			A			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		10.4		14.2		10.4		14.2
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		20.0		17.0		20.0		17.0
Max Q Clear Time (g_c+I1), s		5.8		5.6		2.6		5.8
Green Ext Time (p_c), s		0.6		4.2		0.6		4.1

Intersection Summary	
HCM 2010 Ctrl Delay	5.8
HCM 2010 LOS	A

HCM Signalized Intersection Capacity Analysis
8: SR 1 & Carpenter St

Existing + Proj Alt 2 AM-Miti.syn
3/14/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	402	5	17	18	14	49	19	1230	10	32	1568	702
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9	4.9	4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1681		1665	1782	1572	1736	3539	1395	1770	3438	1538
Flt Permitted	0.95	1.00		0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1681		1665	1782	1572	1736	3539	1395	1770	3438	1538
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	467	6	20	21	16	57	22	1430	12	37	1823	816
RTOR Reduction (vph)	0	17	0	0	0	54	0	0	5	0	0	0
Lane Group Flow (vph)	467	9	0	18	19	3	22	1430	7	37	1823	816
Confl. Peds. (#/hr)				1		1			1	1		
Heavy Vehicles (%)	2%	0%	0%	3%	0%	1%	4%	2%	13%	2%	5%	5%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6			8			Free
Actuated Green, G (s)	18.9	18.9		6.8	6.8	6.8	4.5	69.6	69.6	4.5	70.1	117.7
Effective Green, g (s)	18.9	18.9		6.8	6.8	6.8	4.5	69.6	69.6	4.5	70.1	117.7
Actuated g/C Ratio	0.16	0.16		0.06	0.06	0.06	0.04	0.59	0.59	0.04	0.60	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9	4.9	4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0	5.0	3.0	5.0	
Lane Grp Cap (vph)	551	269		96	102	90	66	2092	824	67	2047	1538
v/s Ratio Prot	c0.14	0.01		0.01	0.01		0.01	0.40		0.02	c0.53	
v/s Ratio Perm						0.00			0.01			c0.53
v/c Ratio	0.85	0.03		0.19	0.19	0.04	0.33	0.68	0.01	0.55	0.89	0.53
Uniform Delay, d1	48.0	41.7		52.8	52.8	52.4	55.1	16.5	9.9	55.6	20.5	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	12.4	0.1		1.6	1.5	0.3	3.0	1.2	0.0	9.5	5.7	1.3
Delay (s)	60.4	41.8		54.5	54.3	52.6	58.1	17.7	9.9	65.1	26.2	1.3
Level of Service	E	D		D	D	D	E	B	A	E	C	A
Approach Delay (s)		59.4			53.3			18.2			19.1	
Approach LOS		E			D			B			B	

Intersection Summary				
HCM 2000 Control Delay	23.7	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.89			
Actuated Cycle Length (s)	117.7	Sum of lost time (s)	17.9	
Intersection Capacity Utilization	69.4%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
8: SR 1 & Carpenter St

Existing + Proj Alt 2 PM-Miti.syn
3/14/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	982	17	17	23	12	52	13	1620	14	54	1471	745
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9	4.9	4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1723		1715	1775	1615	1805	3539	1568	1805	3574	1583
Flt Permitted	0.95	1.00		0.95	0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1723		1715	1775	1615	1805	3539	1568	1805	3574	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1023	18	18	24	12	54	14	1688	15	56	1532	776
RTOR Reduction (vph)	0	13	0	0	0	51	0	0	8	0	0	0
Lane Group Flow (vph)	1023	23	0	18	18	3	14	1688	7	56	1532	776
Heavy Vehicles (%)	2%	0%	4%	0%	0%	0%	0%	2%	3%	0%	1%	2%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6			8			Free
Actuated Green, G (s)	42.3	42.3		7.0	7.0	7.0	3.1	67.8	67.8	6.2	71.4	141.2
Effective Green, g (s)	42.3	42.3		7.0	7.0	7.0	3.1	67.8	67.8	6.2	71.4	141.2
Actuated g/C Ratio	0.30	0.30		0.05	0.05	0.05	0.02	0.48	0.48	0.04	0.51	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9	4.9	4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0	5.0	3.0	5.0	
Lane Grp Cap (vph)	1028	516		85	87	80	39	1699	752	79	1807	1583
v/s Ratio Prot	c0.30	0.01		0.01	0.01		0.01	c0.48		0.03	0.43	
v/s Ratio Perm						0.00			0.00			c0.49
v/c Ratio	1.00	0.05		0.21	0.21	0.03	0.36	0.99	0.01	0.71	0.85	0.49
Uniform Delay, d1	49.3	35.1		64.5	64.4	63.9	68.1	36.5	19.2	66.6	30.2	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	26.8	0.1		2.1	2.0	0.3	5.6	20.2	0.0	25.1	4.3	1.1
Delay (s)	76.1	35.2		66.6	66.5	64.2	73.6	56.7	19.2	91.7	34.5	1.1
Level of Service	E	D		E	E	E	E	E	B	F	C	A
Approach Delay (s)		74.7			65.1			56.5			24.9	
Approach LOS		E			E			E			C	

Intersection Summary				
HCM 2000 Control Delay	46.1	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.97			
Actuated Cycle Length (s)	141.2	Sum of lost time (s)	17.9	
Intersection Capacity Utilization	90.9%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
8: SR 1 & Carpenter St

Back + Proj Alt 2 AM-Miti.syn
3/14/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	402	5	17	18	14	49	19	1291	10	32	1619	702
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9	4.9	4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1681		1665	1782	1572	1736	3539	1395	1770	3438	1538
Flt Permitted	0.95	1.00		0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1681		1665	1782	1572	1736	3539	1395	1770	3438	1538
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	467	6	20	21	16	57	22	1501	12	37	1883	816
RTOR Reduction (vph)	0	17	0	0	0	54	0	0	5	0	0	0
Lane Group Flow (vph)	467	9	0	18	19	3	22	1501	7	37	1883	816
Confl. Peds. (#/hr)				1		1			1	1		
Heavy Vehicles (%)	2%	0%	0%	3%	0%	1%	4%	2%	13%	2%	5%	5%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6			8			Free
Actuated Green, G (s)	18.4	18.4		6.9	6.9	6.9	4.6	70.6	70.6	4.5	71.0	118.3
Effective Green, g (s)	18.4	18.4		6.9	6.9	6.9	4.6	70.6	70.6	4.5	71.0	118.3
Actuated g/C Ratio	0.16	0.16		0.06	0.06	0.06	0.04	0.60	0.60	0.04	0.60	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9	4.9	4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0	5.0	3.0	5.0	
Lane Grp Cap (vph)	533	261		97	103	91	67	2112	832	67	2063	1538
v/s Ratio Prot	c0.14	0.01		0.01	0.01		0.01	0.42		0.02	c0.55	
v/s Ratio Perm						0.00			0.01			c0.53
v/c Ratio	0.88	0.03		0.19	0.18	0.04	0.33	0.71	0.01	0.55	0.91	0.53
Uniform Delay, d1	48.8	42.4		53.0	53.0	52.6	55.3	16.7	9.7	55.9	20.9	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	15.7	0.1		1.6	1.5	0.3	2.9	1.4	0.0	9.5	7.0	1.3
Delay (s)	64.6	42.5		54.6	54.5	52.8	58.2	18.1	9.7	65.4	28.0	1.3
Level of Service	E	D		D	D	D	E	B	A	E	C	A
Approach Delay (s)		63.4			53.5			18.6			20.5	
Approach LOS		E			D			B			C	

Intersection Summary				
HCM 2000 Control Delay	24.9	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.91			
Actuated Cycle Length (s)	118.3	Sum of lost time (s)	17.9	
Intersection Capacity Utilization	70.8%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
8: SR 1 & Carpenter St

Back + Proj Alt 2 PM-Miti.syn
3/14/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	982	17	17	23	12	52	13	1688	14	54	1547	745
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9	4.9	4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1723		1715	1775	1615	1805	3539	1568	1805	3574	1583
Flt Permitted	0.95	1.00		0.95	0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1723		1715	1775	1615	1805	3539	1568	1805	3574	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1023	18	18	24	12	54	14	1758	15	56	1611	776
RTOR Reduction (vph)	0	13	0	0	0	51	0	0	8	0	0	0
Lane Group Flow (vph)	1023	23	0	18	18	3	14	1758	7	56	1611	776
Heavy Vehicles (%)	2%	0%	4%	0%	0%	0%	0%	2%	3%	0%	1%	2%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6			8			Free
Actuated Green, G (s)	41.3	41.3		7.0	7.0	7.0	3.1	68.8	68.8	6.2	72.4	141.2
Effective Green, g (s)	41.3	41.3		7.0	7.0	7.0	3.1	68.8	68.8	6.2	72.4	141.2
Actuated g/C Ratio	0.29	0.29		0.05	0.05	0.05	0.02	0.49	0.49	0.04	0.51	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9	4.9	4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0	5.0	3.0	5.0	
Lane Grp Cap (vph)	1004	503		85	87	80	39	1724	764	79	1832	1583
v/s Ratio Prot	c0.30	0.01		0.01	0.01		0.01	c0.50		0.03	0.45	
v/s Ratio Perm						0.00			0.00			c0.49
v/c Ratio	1.02	0.05		0.21	0.21	0.03	0.36	1.02	0.01	0.71	0.88	0.49
Uniform Delay, d1	49.9	35.8		64.5	64.4	63.9	68.1	36.2	18.6	66.6	30.5	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	33.2	0.1		2.1	2.0	0.3	5.6	26.8	0.0	25.1	5.6	1.1
Delay (s)	83.2	35.9		66.6	66.5	64.2	73.6	63.0	18.7	91.7	36.1	1.1
Level of Service	F	D		E	E	E	E	E	B	F	D	A
Approach Delay (s)		81.6			65.1			62.7			26.3	
Approach LOS		F			E			E			C	

Intersection Summary				
HCM 2000 Control Delay	49.9	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	1.00			
Actuated Cycle Length (s)	141.2	Sum of lost time (s)	17.9	
Intersection Capacity Utilization	92.8%	ICU Level of Service	F	
Analysis Period (min)	15			

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	0	853	539	61	1140	835
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9	4.0
Lane Util. Factor		0.88	0.95		0.97	1.00
Frt		0.85	0.98		1.00	1.00
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		2760	3468		3335	1759
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		2760	3468		3335	1759
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	927	586	66	1239	908
RTOR Reduction (vph)	0	185	9	0	0	0
Lane Group Flow (vph)	0	742	643	0	1239	908
Heavy Vehicles (%)	0%	3%	2%	7%	5%	8%
Turn Type		Over	NA		Prot	NA
Protected Phases		3	2		3	Free
Permitted Phases						
Actuated Green, G (s)		25.2	15.8		25.2	50.8
Effective Green, g (s)		25.2	15.8		25.2	50.8
Actuated g/C Ratio		0.50	0.31		0.50	1.00
Clearance Time (s)		4.9	4.9		4.9	
Vehicle Extension (s)		4.5	3.5		4.5	
Lane Grp Cap (vph)		1369	1078		1654	1759
v/s Ratio Prot		0.27	0.19		c0.37	0.52
v/s Ratio Perm						
v/c Ratio		0.54	0.60		0.75	0.52
Uniform Delay, d1		8.8	14.8		10.3	0.0
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		0.7	0.9		2.2	1.1
Delay (s)		9.5	15.8		12.4	1.1
Level of Service		A	B		B	A
Approach Delay (s)	9.5		15.8			7.6
Approach LOS	A		B			A

Intersection Summary			
HCM 2000 Control Delay	9.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	50.8	Sum of lost time (s)	9.8
Intersection Capacity Utilization	57.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	133	229	36	140	183	173	23	294	85	326	468	41
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1842	1900	1863	1810	1827	1759	1835	1900	1827	1827	1759
Adj Flow Rate, veh/h	145	249	39	152	199	188	25	320	92	354	509	45
Adj No. of Lanes	1	2	0	1	1	2	1	2	0	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	3	3	2	5	4	8	4	4	4	4	8
Cap, veh/h	209	644	100	211	386	576	76	700	198	486	657	534
Arrive On Green	0.12	0.21	0.21	0.12	0.21	0.21	0.05	0.26	0.26	0.14	0.36	0.36
Sat Flow, veh/h	1774	3038	470	1774	1810	2701	1675	2681	758	3375	1827	1485
Grp Volume(v), veh/h	145	142	146	152	199	188	25	206	206	354	509	45
Grp Sat Flow(s),veh/h/ln	1774	1750	1758	1774	1810	1351	1675	1743	1696	1688	1827	1485
Q Serve(g_s), s	4.9	4.3	4.5	5.2	6.1	3.7	0.9	6.2	6.4	6.3	15.4	1.2
Cycle Q Clear(g_c), s	4.9	4.3	4.5	5.2	6.1	3.7	0.9	6.2	6.4	6.3	15.4	1.2
Prop In Lane	1.00		0.27	1.00		1.00	1.00		0.45	1.00		1.00
Lane Grp Cap(c), veh/h	209	371	373	211	386	576	76	455	443	486	657	534
V/C Ratio(X)	0.69	0.38	0.39	0.72	0.52	0.33	0.33	0.45	0.47	0.73	0.77	0.08
Avail Cap(c_a), veh/h	264	782	786	264	809	1207	215	726	706	557	828	673
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.5	21.1	21.1	26.5	21.7	20.8	28.9	19.3	19.4	25.6	17.7	13.2
Incr Delay (d2), s/veh	5.5	0.8	0.8	7.0	1.3	0.4	2.5	0.9	0.9	4.1	3.9	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	2.2	2.2	2.9	3.2	1.4	0.5	3.1	3.1	3.2	8.5	0.5
LnGrp Delay(d),s/veh	32.0	21.9	21.9	33.5	23.0	21.2	31.4	20.2	20.3	29.7	21.6	13.3
LnGrp LOS	C	C	C	C	C	C	C	C	C	C	C	B
Approach Vol, veh/h		433			539			437			908	
Approach Delay, s/veh		25.3			25.3			20.9			24.4	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.1	17.4	6.5	27.4	11.1	17.5	12.7	21.2
Change Period (Y+Rc), s	3.7	* 4.2	3.7	4.9	3.7	* 4.2	3.7	4.9
Max Green Setting (Gmax), s	9.3	* 28	8.0	28.3	9.3	* 28	10.3	26.0
Max Q Clear Time (g_c+I1), s	7.2	6.5	2.9	17.4	6.9	8.1	8.3	8.4
Green Ext Time (p_c), s	0.1	4.6	0.0	4.7	0.1	4.5	0.3	6.1

Intersection Summary	
HCM 2010 Ctrl Delay	24.1
HCM 2010 LOS	C

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM Signalized Intersection Capacity Analysis
8: SR 1 & Carpenter St

Cum + Proj Alt 2 AM-Miti.syn
3/14/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	402	5	17	18	14	49	19	1410	10	32	1774	702
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9	4.9	4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1681		1665	1782	1572	1736	3539	1395	1770	3438	1538
Flt Permitted	0.95	1.00		0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1681		1665	1782	1572	1736	3539	1395	1770	3438	1538
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	467	6	20	21	16	57	22	1640	12	37	2063	816
RTOR Reduction (vph)	0	17	0	0	0	54	0	0	5	0	0	0
Lane Group Flow (vph)	467	9	0	18	19	3	22	1640	7	37	2063	816
Confl. Peds. (#/hr)				1		1			1	1		
Heavy Vehicles (%)	2%	0%	0%	3%	0%	1%	4%	2%	13%	2%	5%	5%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6			8			Free
Actuated Green, G (s)	17.2	17.2		6.9	6.9	6.9	4.6	71.7	71.7	4.5	72.1	118.2
Effective Green, g (s)	17.2	17.2		6.9	6.9	6.9	4.6	71.7	71.7	4.5	72.1	118.2
Actuated g/C Ratio	0.15	0.15		0.06	0.06	0.06	0.04	0.61	0.61	0.04	0.61	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9	4.9	4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0	5.0	3.0	5.0	
Lane Grp Cap (vph)	499	244		97	104	91	67	2146	846	67	2097	1538
v/s Ratio Prot	c0.14	0.01		0.01	0.01		0.01	0.46		0.02	c0.60	
v/s Ratio Perm						0.00			0.01			c0.53
v/c Ratio	0.94	0.04		0.19	0.18	0.04	0.33	0.76	0.01	0.55	0.98	0.53
Uniform Delay, d1	50.0	43.4		53.0	53.0	52.5	55.3	17.1	9.2	55.9	22.5	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	25.6	0.1		1.6	1.5	0.3	2.9	2.0	0.0	9.5	16.0	1.3
Delay (s)	75.5	43.5		54.6	54.4	52.8	58.2	19.0	9.2	65.4	38.5	1.3
Level of Service	E	D		D	D	D	E	B	A	E	D	A
Approach Delay (s)		73.8			53.5			19.5			28.4	
Approach LOS		E			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	30.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	118.2	Sum of lost time (s)	17.9
Intersection Capacity Utilization	75.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
1: SR 1 & Carmel Valley Rd

Cum + Proj Alt 2 PM-Miti.syn
3/14/2016

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	0	968	974	105	993	770
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9	4.0
Lane Util. Factor		0.88	0.95		0.97	1.00
Frt		0.85	0.99		1.00	1.00
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		2814	3481		3467	1881
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		2814	3481		3467	1881
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	1030	1036	112	1056	819
RTOR Reduction (vph)	0	96	5	0	0	0
Lane Group Flow (vph)	0	934	1143	0	1056	819
Heavy Vehicles (%)	0%	1%	2%	4%	1%	1%
Turn Type		Over	NA		Prot	NA
Protected Phases		3	2		3	Free
Permitted Phases						
Actuated Green, G (s)		20.3	26.8		20.3	56.9
Effective Green, g (s)		20.3	26.8		20.3	56.9
Actuated g/C Ratio		0.36	0.47		0.36	1.00
Clearance Time (s)		4.9	4.9		4.9	
Vehicle Extension (s)		4.5	3.5		4.5	
Lane Grp Cap (vph)		1003	1639		1236	1881
v/s Ratio Prot		c0.33	c0.33		0.30	0.44
v/s Ratio Perm						
v/c Ratio		0.93	0.70		0.85	0.44
Uniform Delay, d1		17.6	11.9		16.9	0.0
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		14.9	1.4		6.4	0.7
Delay (s)		32.6	13.2		23.3	0.7
Level of Service		C	B		C	A
Approach Delay (s)	32.6		13.2			13.5
Approach LOS	C		B			B

Intersection Summary			
HCM 2000 Control Delay	18.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	56.9	Sum of lost time (s)	9.8
Intersection Capacity Utilization	72.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM 2010 Signalized Intersection Summary
3: SR 1 & Rio Rd

Cum + Proj Alt 2 PM-Miti.syn
3/14/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	143	367	83	190	418	355	162	581	164	329	397	44
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1878	1900	1881	1881	1863	1881	1849	1900	1881	1881	1900
Adj Flow Rate, veh/h	146	374	85	194	427	362	165	593	167	336	405	45
Adj No. of Lanes	1	2	0	1	1	2	1	2	0	2	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	1	1	1	1	2	1	3	3	1	1	0
Cap, veh/h	169	893	201	211	623	916	199	752	211	370	514	437
Arrive On Green	0.10	0.31	0.31	0.12	0.33	0.33	0.11	0.28	0.28	0.11	0.27	0.27
Sat Flow, veh/h	1774	2896	651	1792	1881	2766	1792	2706	760	3476	1881	1600
Grp Volume(v), veh/h	146	229	230	194	427	362	165	384	376	336	405	45
Grp Sat Flow(s),veh/h/ln	1774	1784	1763	1792	1881	1383	1792	1756	1710	1738	1881	1600
Q Serve(g_s), s	7.1	8.9	9.1	9.3	17.1	8.8	7.9	17.7	17.7	8.3	17.4	1.8
Cycle Q Clear(g_c), s	7.1	8.9	9.1	9.3	17.1	8.8	7.9	17.7	17.7	8.3	17.4	1.8
Prop In Lane	1.00		0.37	1.00		1.00	1.00		0.44	1.00		1.00
Lane Grp Cap(c), veh/h	169	550	543	211	623	916	199	488	475	370	514	437
V/C Ratio(X)	0.87	0.42	0.42	0.92	0.69	0.40	0.83	0.79	0.79	0.91	0.79	0.10
Avail Cap(c_a), veh/h	169	550	543	211	623	916	211	543	529	370	561	477
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	38.9	23.9	24.0	38.1	25.2	22.5	38.0	29.1	29.1	38.6	29.4	23.7
Incr Delay (d2), s/veh	34.4	0.6	0.6	39.7	6.0	1.3	22.2	7.2	7.5	25.3	7.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.1	4.5	4.5	7.0	9.9	3.5	5.1	9.5	9.3	5.3	10.0	0.8
LnGrp Delay(d),s/veh	73.4	24.6	24.6	77.8	31.3	23.7	60.1	36.3	36.7	63.8	36.5	23.8
LnGrp LOS	E	C	C	E	C	C	E	D	D	E	D	C
Approach Vol, veh/h		605			983			925			786	
Approach Delay, s/veh		36.4			37.7			40.7			47.4	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.0	31.1	13.4	28.8	12.0	33.1	13.0	29.2
Change Period (Y+Rc), s	3.7	* 4.2	3.7	4.9	3.7	* 4.2	3.7	4.9
Max Green Setting (Gmax), s	10.3	* 27	10.3	26.0	8.3	* 29	9.3	27.0
Max Q Clear Time (g_c+I1), s	11.3	11.1	9.9	19.4	9.1	19.1	10.3	19.7
Green Ext Time (p_c), s	0.0	7.8	0.0	4.0	0.0	5.7	0.0	4.3

Intersection Summary	
HCM 2010 Ctrl Delay	40.6
HCM 2010 LOS	D

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM Signalized Intersection Capacity Analysis
8: SR 1 & Carpenter St

Cum + Proj Alt 2 PM-Miti.syn
3/14/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	982	17	17	23	12	52	13	1906	14	54	1737	745
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9	4.9	4.2	4.9	4.0
Lane Util. Factor	0.97	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1723		1715	1775	1615	1805	3539	1568	1805	3574	1583
Flt Permitted	0.95	1.00		0.95	0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1723		1715	1775	1615	1805	3539	1568	1805	3574	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1023	18	18	24	12	54	14	1985	15	56	1809	776
RTOR Reduction (vph)	0	13	0	0	0	51	0	0	7	0	0	0
Lane Group Flow (vph)	1023	23	0	18	18	3	14	1985	8	56	1809	776
Heavy Vehicles (%)	2%	0%	4%	0%	0%	0%	0%	2%	3%	0%	1%	2%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	Free
Protected Phases	2	2		6	6		3	8		7	4	
Permitted Phases						6			8			Free
Actuated Green, G (s)	39.2	39.2		7.0	7.0	7.0	3.1	70.8	70.8	6.2	74.4	141.1
Effective Green, g (s)	39.2	39.2		7.0	7.0	7.0	3.1	70.8	70.8	6.2	74.4	141.1
Actuated g/C Ratio	0.28	0.28		0.05	0.05	0.05	0.02	0.50	0.50	0.04	0.53	1.00
Clearance Time (s)	4.6	4.6		4.2	4.2	4.2	3.7	4.9	4.9	4.2	4.9	
Vehicle Extension (s)	4.5	4.5		4.5	4.5	4.5	3.0	5.0	5.0	3.0	5.0	
Lane Grp Cap (vph)	953	478		85	88	80	39	1775	786	79	1884	1583
v/s Ratio Prot	c0.30	0.01		0.01	0.01		0.01	c0.56		0.03	0.51	
v/s Ratio Perm						0.00			0.00			c0.49
v/c Ratio	1.07	0.05		0.21	0.20	0.03	0.36	1.12	0.01	0.71	0.96	0.49
Uniform Delay, d1	50.9	37.3		64.4	64.4	63.8	68.0	35.1	17.6	66.6	31.9	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	51.0	0.1		2.1	2.0	0.3	5.6	61.5	0.0	25.1	12.9	1.1
Delay (s)	101.9	37.4		66.5	66.4	64.1	73.6	96.7	17.6	91.7	44.8	1.1
Level of Service	F	D		E	E	E	E	F	B	F	D	A
Approach Delay (s)		99.7			65.1			95.9			33.0	
Approach LOS		F			E			F			C	

Intersection Summary			
HCM 2000 Control Delay	67.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	141.1	Sum of lost time (s)	17.9
Intersection Capacity Utilization	98.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Appendix M

Project Alternative Scenarios Road Segment LOS Calculations

Arterial Level of Service

Existing AM

Seg # Arterial Level of Service: NB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	IV	35	32.3	3.2	35.5	0.27	27.3	A
11	From Shopping Center Dwy to Carmel Valley Rd	IV	35	15.6	28.0	43.6	0.12	9.5	D
	Total	IV		47.9	31.2	79.1	0.38	17.5	C

Arterial Level of Service: SB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	IV	35	19.1	3.6	22.7	0.12	18.3	C
12	From Shopping Center Dwy to Rio Rd	IV	35	32.3	10.2	42.5	0.27	22.9	B
	Total	IV		51.4	13.8	65.2	0.39	21.3	B

Arterial Level of Service: EB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	IV	25	66.1	23.9	90.0	0.43	17.3	C
13	From SR 1 to Crossroads Blvd	IV	25	25.0	6.6	31.6	0.11	12.9	D
14	From Crossroads Blvd to Carmel Center Pl	IV	25	11.0	1.3	12.3	0.04	12.2	D
15	From Carmel Center Pl to Carmel Rancho Blvd	IV	25	30.1	7.7	37.8	0.17	16.1	C
	Total			132.2	39.5	171.7	0.76	15.8	C

Arterial Level of Service: WB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	IV	25	30.1	2.2	32.3	0.18	20.3	B
14	From Carmel Center Pl to Crossroads Blvd	IV	25	11.0	4.6	15.6	0.04	9.6	D
13	From Crossroads Blvd to SR 1	IV	25	25.0	30.8	55.8	0.11	7.3	E
5	From SR 1 to Atherton Dr	IV	25	79.2	0.0	79.2	0.43	19.6	B
	Total			145.3	37.6	182.9	0.77	15.1	C

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.

Arterial Level of Service

Existing + Project Alt 1 AM | **Existing + Project Alt 1 AM-Miti**

Seg # Arterial Level of Service: NB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	IV	35	32.3	3.2	35.5	0.27	27.3	A	3.2	35.5	0.27	27.3	A
11	From Shopping Center Dwy to Carmel Valley Rd	IV	35	15.6	28.0	43.6	0.12	9.5	D	28.0	43.6	0.12	9.5	D
	Total	IV		47.9	31.2	79.1	0.38	17.5	C	31.2	79.1	0.38	17.5	C

Arterial Level of Service: SB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	IV	35	19.1	3.6	22.7	0.12	18.3	C	3.6	22.7	0.12	18.3	C
12	From Shopping Center Dwy to Rio Rd	IV	35	32.3	10.2	42.5	0.27	22.9	B	10.2	42.5	0.27	22.9	B
	Total	IV		51.4	13.8	65.2	0.39	21.3	B	13.8	65.2	0.39	21.3	B

Arterial Level of Service: EB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	IV	25	66.1	23.8	89.9	0.43	17.3	C	22.9	89.0	0.43	17.5	C
13	From SR 1 to Crossroads Blvd	IV	25	25.0	6.7	31.7	0.11	12.9	D	6.6	31.6	0.11	12.9	D
14	From Crossroads Blvd to Carmel Center Pl	IV	25	11.0	1.3	12.3	0.04	12.2	D	1.3	12.3	0.04	12.2	D
15	From Carmel Center Pl to Carmel Rancho Blvd	IV	25	30.1	7.7	37.8	0.17	16.1	C	7.7	37.8	0.17	16.1	C
	Total			132.2	39.5	171.7	0.76	15.8	C	38.5	170.7	0.76	15.9	C

Arterial Level of Service: WB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	IV	25	30.1	2.2	32.3	0.18	20.3	B	2.2	32.3	0.18	20.3	B
14	From Carmel Center Pl to Crossroads Blvd	IV	25	11.0	4.6	15.6	0.04	9.6	D	4.6	15.6	0.04	9.6	D
13	From Crossroads Blvd to SR 1	IV	25	25.0	30.8	55.8	0.11	7.3	E	29.4	54.4	0.11	7.5	E
5	From SR 1 to Atherton Dr	IV	25	66.1	0.0	66.1	0.43	23.5	B	0.0	66.1	0.43	23.5	B
	Total			132.2	37.6	169.8	0.77	16.3	C	36.2	168.4	0.77	16.4	C

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.
2. Arterial speed highlighted in yellow indicates project impact.

Arterial Level of Service

Existing PM

Seg # Arterial Level of Service: NB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	IV	35	32.3	6.6	38.9	0.27	24.9	B
11	From Shopping Center Dwy to Carmel Valley Rd	IV	35	15.6	30.9	46.5	0.12	8.9	E
	Total	IV		47.9	37.5	85.4	0.38	16.2	C

Arterial Level of Service: SB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	IV	35	19.1	5.7	24.8	0.12	16.8	C
12	From Shopping Center Dwy to Rio Rd	IV	35	32.3	10.7	43.0	0.27	22.6	B
	Total	IV		51.4	16.4	67.8	0.39	20.5	B

Arterial Level of Service: EB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	IV	25	66.1	23.7	89.8	0.43	17.3	C
13	From SR 1 to Crossroads Blvd	IV	25	25.0	9.9	34.9	0.11	11.7	D
14	From Crossroads Blvd to Carmel Center Pl	IV	25	11.0	2.6	13.6	0.04	11.0	D
15	From Carmel Center Pl to Carmel Rancho Blvd	IV	25	29.6	8.1	37.7	0.18	17.1	C
	Total			131.7	44.3	176.0	0.77	15.7	C

Arterial Level of Service: WB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	IV	25	29.6	3.3	32.9	0.18	19.6	B
14	From Carmel Center Pl to Crossroads Blvd	IV	25	11.0	7.0	18.0	0.04	8.3	E
13	From Crossroads Blvd to SR 1	IV	25	25.0	31.5	56.5	0.11	7.2	E
5	From SR 1 to Atherton Dr	IV	25	66.1	0.0	66.1	0.43	23.5	B
	Total			131.7	41.8	173.5	0.77	15.9	C

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.

Arterial Level of Service

Existing + Project Alt 1 PM | **Existing + Project Alt 1 PM-Miti**

Seg # Arterial Level of Service: NB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	IV	35	32.3	6.6	38.9	0.27	24.9	B	6.6	38.9	0.27	24.9	B
11	From Shopping Center Dwy to Carmel Valley Rd	IV	35	15.6	31.0	46.6	0.12	8.9	E	31.0	46.6	0.12	8.9	E
	Total	IV		47.9	37.6	85.5	0.38	16.2	C	37.6	85.5	0.38	16.2	C

Arterial Level of Service: SB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	IV	35	19.1	5.7	24.8	0.12	16.8	C	5.7	24.8	0.12	16.8	C
12	From Shopping Center Dwy to Rio Rd	IV	35	32.3	10.7	43.0	0.27	22.6	B	10.7	43.0	0.27	22.6	B
	Total	IV		51.4	16.4	67.8	0.39	20.5	B	16.4	67.8	0.39	20.5	B

Arterial Level of Service: EB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	IV	25	66.1	23.7	89.8	0.43	17.3	C	21.9	88.0	0.43	17.7	C
13	From SR 1 to Crossroads Blvd	IV	25	25.0	10.0	35.0	0.11	11.7	D	10.0	35.0	0.11	11.7	D
14	From Crossroads Blvd to Carmel Center Pl	IV	25	11.0	2.6	13.6	0.04	11.0	D	2.6	13.6	0.04	11.0	D
15	From Carmel Center Pl to Carmel Rancho Blvd	IV	25	29.6	8.1	37.7	0.18	17.1	C	8.1	37.7	0.18	17.1	C
	Total			131.7	44.4	176.1	0.77	15.7	C	42.6	174.3	0.77	15.8	C

Arterial Level of Service: WB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	IV	25	29.6	3.3	32.9	0.18	19.6	B	3.3	32.9	0.18	19.6	B
14	From Carmel Center Pl to Crossroads Blvd	IV	25	11.0	7.0	18.0	0.04	8.3	E	7.0	18.0	0.04	8.3	E
13	From Crossroads Blvd to SR 1	IV	25	25.0	31.6	56.6	0.11	7.2	E	28.7	53.7	0.11	7.6	E
5	From SR 1 to Atherton Dr	IV	25	66.1	0.0	66.1	0.43	23.5	B	0.0	66.1	0.43	23.5	B
	Total			131.7	41.9	173.6	0.77	15.9	C	39.0	170.7	0.77	16.2	C

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.
2. Arterial speed highlighted in yellow indicates project impact.

Arterial Level of Service

Background AM

Seg # Arterial Level of Service: NB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	IV	35	32.3	3.2	35.5	0.27	27.3	A
11	From Shopping Center Dwy to Carmel Valley Rd	IV	35	15.6	29.5	45.1	0.12	9.2	D
	Total	IV		47.9	32.7	80.6	0.38	17.2	C

Arterial Level of Service: SB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	IV	35	19.1	3.7	22.8	0.12	18.2	C
12	From Shopping Center Dwy to Rio Rd	IV	35	32.3	10.4	42.7	0.27	22.8	B
	Total	IV		51.4	14.1	65.5	0.39	21.2	B

Arterial Level of Service: EB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	IV	25	66.1	23.9	90.0	0.43	17.3	C
13	From SR 1 to Crossroads Blvd	IV	25	25.0	7.4	32.4	0.11	12.6	D
14	From Crossroads Blvd to Carmel Center Pl	IV	25	11.0	1.4	12.4	0.04	12.1	D
15	From Carmel Center Pl to Carmel Rancho Blvd	IV	25	30.1	7.8	37.9	0.17	16.0	C
	Total			132.2	40.5	172.7	0.76	15.8	C

Arterial Level of Service: WB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	IV	25	30.1	2.2	32.3	0.18	20.3	B
14	From Carmel Center Pl to Crossroads Blvd	IV	25	11.0	4.6	15.6	0.04	9.6	D
13	From Crossroads Blvd to SR 1	IV	25	25.0	30.8	55.8	0.11	7.3	E
5	From SR 1 to Atherton Dr	IV	25	66.1	0.0	66.1	0.43	23.5	B
	Total			132.2	37.6	169.8	0.77	16.3	C

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.

Arterial Level of Service

Background + Project Alt 1 AM | **Background + Project Alt 1 AM-Miti**

Seg # Arterial Level of Service: NB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	IV	35	32.3	3.2	35.5	0.27	27.3	A	3.2	35.5	0.27	27.3	A
11	From Shopping Center Dwy to Carmel Valley Rd	IV	35	15.6	29.5	45.1	0.12	9.2	D	29.5	45.1	0.12	9.2	D
	Total	IV		47.9	32.7	80.6	0.38	17.2	C	32.7	80.6	0.38	17.2	C

Arterial Level of Service: SB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	IV	35	19.1	3.8	22.9	0.12	18.2	C	3.8	22.9	0.12	18.2	C
12	From Shopping Center Dwy to Rio Rd	IV	35	32.3	10.4	42.7	0.27	22.8	B	10.4	42.7	0.27	22.8	B
	Total	IV		51.4	14.2	65.6	0.39	21.2	B	14.2	65.6	0.39	21.2	B

Arterial Level of Service: EB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	IV	25	66.1	23.9	90.0	0.43	17.3	C	23.7	89.8	0.43	17.3	C
13	From SR 1 to Crossroads Blvd	IV	25	25.0	7.4	32.4	0.11	12.6	D	7.4	32.4	0.11	12.6	D
14	From Crossroads Blvd to Carmel Center Pl	IV	25	11.0	1.4	12.4	0.04	12.1	D	1.4	12.4	0.04	12.1	D
15	From Carmel Center Pl to Carmel Rancho Blvd	IV	25	30.1	7.8	37.9	0.17	16.0	C	7.8	37.9	0.17	16.0	C
	Total			132.2	40.5	172.7	0.76	15.8	C	40.3	172.5	0.76	15.8	C

Arterial Level of Service: WB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	IV	25	30.1	2.2	32.3	0.18	20.3	B	2.2	32.3	0.18	20.3	B
14	From Carmel Center Pl to Crossroads Blvd	IV	25	11.0	4.6	15.6	0.04	9.6	D	4.6	15.6	0.04	9.6	D
13	From Crossroads Blvd to SR 1	IV	25	25.0	30.8	55.8	0.11	7.3	E	29.5	54.5	0.11	7.5	E
5	From SR 1 to Atherton Dr	IV	25	66.1	0.0	66.1	0.43	23.5	B	0.0	66.1	0.43	23.5	B
	Total			132.2	37.6	169.8	0.77	16.3	C	36.3	168.5	0.77	16.4	C

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.
2. Arterial speed highlighted in yellow indicates project impact.

Arterial Level of Service

Background PM

Seg # Arterial Level of Service: NB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	IV	35	32.3	6.7	39.0	0.27	24.8	B
11	From Shopping Center Dwy to Carmel Valley Rd	IV	35	15.6	33.0	48.6	0.12	8.6	E
	Total	IV		47.9	39.7	87.6	0.38	15.8	C

Arterial Level of Service: SB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	IV	35	19.1	5.8	24.9	0.12	16.7	C
12	From Shopping Center Dwy to Rio Rd	IV	35	32.3	10.9	43.2	0.27	22.5	B
	Total	IV		51.4	16.7	68.1	0.39	20.4	B

Arterial Level of Service: EB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	IV	25	66.1	23.9	90.0	0.43	17.3	C
13	From SR 1 to Crossroads Blvd	IV	25	25.0	10.1	35.1	0.11	11.7	D
14	From Crossroads Blvd to Carmel Center Pl	IV	25	11.0	2.7	13.7	0.04	10.9	D
15	From Carmel Center Pl to Carmel Rancho Blvd	IV	25	29.6	8.1	37.7	0.18	17.1	C
	Total			131.7	44.8	176.5	0.77	15.6	C

Arterial Level of Service: WB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	IV	25	29.6	3.3	32.9	0.18	19.6	B
14	From Carmel Center Pl to Crossroads Blvd	IV	25	11.0	6.9	17.9	0.04	8.4	E
13	From Crossroads Blvd to SR 1	IV	25	25.0	31.7	56.7	0.11	7.2	E
5	From SR 1 to Atherton Dr	IV	25	66.1	0.0	66.1	0.43	23.5	B
	Total			131.7	41.9	173.6	0.77	15.9	C

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.

Arterial Level of Service

Background + Project Alt 1 PM | **Background + Project Alt 1 PM-Miti**

Seg # Arterial Level of Service: NB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	IV	35	32.3	6.7	39.0	0.27	24.8	B	6.7	39.0	0.27	24.8	B
11	From Shopping Center Dwy to Carmel Valley Rd	IV	35	15.6	33.1	48.7	0.12	8.5	E	33.1	48.7	0.12	8.5	E
	Total	IV		47.9	39.8	87.7	0.38	15.8	C	39.8	87.7	0.38	15.8	C

Arterial Level of Service: SB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	IV	35	19.1	5.8	24.9	0.12	16.7	C	5.8	24.9	0.12	16.7	C
12	From Shopping Center Dwy to Rio Rd	IV	35	32.3	10.9	43.2	0.27	22.5	B	10.9	43.2	0.27	22.5	B
	Total	IV		51.4	16.7	68.1	0.39	20.4	B	16.7	68.1	0.39	20.4	B

Arterial Level of Service: EB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	IV	25	66.1	23.9	90.0	0.43	17.3	C	22.0	88.1	0.43	17.6	C
13	From SR 1 to Crossroads Blvd	IV	25	25.0	10.2	35.2	0.11	11.6	D	10.2	35.2	0.11	11.6	D
14	From Crossroads Blvd to Carmel Center Pl	IV	25	11.0	2.7	13.7	0.04	10.9	D	2.7	13.7	0.04	10.9	D
15	From Carmel Center Pl to Carmel Rancho Blvd	IV	25	29.6	8.1	37.7	0.18	17.1	C	8.1	37.7	0.18	17.1	C
	Total			131.7	44.9	176.6	0.77	15.6	C	43.0	174.7	0.77	15.8	C

Arterial Level of Service: WB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	IV	25	29.6	3.3	32.9	0.18	19.6	B	3.3	32.9	0.18	19.6	B
14	From Carmel Center Pl to Crossroads Blvd	IV	25	11.0	6.9	17.9	0.04	8.4	E	6.9	17.9	0.04	8.4	E
13	From Crossroads Blvd to SR 1	IV	25	25.0	31.7	56.7	0.11	7.2	E	28.8	53.8	0.11	7.6	E
5	From SR 1 to Atherton Dr	IV	25	66.1	0.0	66.1	0.43	23.5	B	0.0	66.1	0.43	23.5	B
	Total			131.7	41.9	173.6	0.77	15.9	C	39.0	170.7	0.77	16.2	C

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.
2. Arterial speed highlighted in yellow indicates project impact.

Arterial Level of Service

Cumulative AM

Seg # Arterial Level of Service: NB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	IV	35	32.3	3.3	35.6	0.27	27.2	A
11	From Shopping Center Dwy to Carmel Valley Rd	IV	35	15.6	29.9	45.5	0.12	9.1	D
	Total	IV		47.9	33.2	81.1	0.38	17.1	C

Arterial Level of Service: SB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	IV	35	19.1	3.9	23.0	0.12	18.1	C
12	From Shopping Center Dwy to Rio Rd	IV	35	32.3	10.9	43.2	0.27	22.5	B
	Total	IV		51.4	14.8	66.2	0.39	21.0	B

Arterial Level of Service: EB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	IV	25	66.1	24.7	90.8	0.43	17.1	C
13	From SR 1 to Crossroads Blvd	IV	25	25.0	12.5	37.5	0.11	10.9	D
14	From Crossroads Blvd to Carmel Center Pl	IV	25	11.0	5.9	16.9	0.04	8.9	E
15	From Carmel Center Pl to Carmel Rancho Blvd	IV	25	30.1	7.8	37.9	0.17	16.0	C
	Total			132.2	50.9	183.1	0.76	14.9	C

Arterial Level of Service: WB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	IV	25	30.1	2.3	32.4	0.18	20.2	B
14	From Carmel Center Pl to Crossroads Blvd	IV	25	11.0	11.1	22.1	0.04	6.8	F
13	From Crossroads Blvd to SR 1	IV	25	25.0	31.7	56.7	0.11	7.2	E
5	From SR 1 to Atherton Dr	IV	25	66.1	0.0	66.1	0.43	23.5	B
	Total			132.2	45.1	177.3	0.77	15.6	C

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.

Arterial Level of Service

Cumulative Plus Project Alt 1 AM | **Cumulative Plus Project Alt 1 AM-Miti**

Seg # Arterial Level of Service: NB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	IV	35	32.3	3.3	35.6	0.27	27.2	A	3.3	35.6	0.27	27.2	A
11	From Shopping Center Dwy to Carmel Valley Rd	IV	35	15.6	29.9	45.5	0.12	9.1	D	29.9	45.5	0.12	9.1	D
	Total	IV		47.9	33.2	81.1	0.38	17.1	C	33.2	81.1	0.38	17.1	C

Arterial Level of Service: SB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	IV	35	19.1	3.9	23.0	0.12	18.1	C	3.9	23.0	0.12	18.1	C
12	From Shopping Center Dwy to Rio Rd	IV	35	32.3	10.9	43.2	0.27	22.5	B	10.9	43.2	0.27	22.5	B
	Total	IV		51.4	14.8	66.2	0.39	21.0	B	14.8	66.2	0.39	21.0	B

Arterial Level of Service: EB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	IV	25	66.1	24.7	90.8	0.43	17.1	C	23.9	90.0	0.43	17.3	C
13	From SR 1 to Crossroads Blvd	IV	25	25.0	12.5	37.5	0.11	10.9	D	11.2	36.2	0.11	11.3	D
14	From Crossroads Blvd to Carmel Center Pl	IV	25	11.0	5.9	16.9	0.04	8.9	E	5.9	16.9	0.04	8.9	E
15	From Carmel Center Pl to Carmel Rancho Blvd	IV	25	30.1	7.8	37.9	0.17	16.0	C	7.8	37.9	0.17	16.0	C
	Total			132.2	50.9	183.1	0.76	14.9	C	48.8	181.0	0.76	15.0	C

Arterial Level of Service: WB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	IV	25	30.1	2.3	32.4	0.18	20.3	B	2.3	32.4	0.18	20.3	B
14	From Carmel Center Pl to Crossroads Blvd	IV	25	11.0	11.2	22.2	0.04	6.8	F	10.0	21.0	0.04	7.1	E
13	From Crossroads Blvd to SR 1	IV	25	25.0	31.7	56.7	0.11	7.2	E	30.7	55.7	0.11	7.3	E
5	From SR 1 to Atherton Dr	IV	25	66.1	0.0	66.1	0.43	23.5	B	0.0	66.1	0.43	23.5	B
	Total			132.2	45.2	177.4	0.77	15.6	C	43.0	175.2	0.77	15.8	C

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.
2. Arterial speed highlighted in yellow indicates project impact.

Arterial Level of Service

Cumulative PM

Seg # Arterial Level of Service: NB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	IV	35	32.3	7.0	39.3	0.27	24.6	B
11	From Shopping Center Dwy to Carmel Valley Rd	IV	35	15.6	34.7	50.3	0.12	8.3	E
	Total	IV		47.9	41.7	89.6	0.38	15.4	C

Arterial Level of Service: SB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	IV	35	19.1	6.2	25.3	0.12	16.4	C
12	From Shopping Center Dwy to Rio Rd	IV	35	32.3	11.7	44.0	0.27	22.1	B
	Total	IV		51.4	17.9	69.3	0.39	20.0	B

Arterial Level of Service: EB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	IV	25	66.1	25.1	91.2	0.43	17.0	C
13	From SR 1 to Crossroads Blvd	IV	25	25.0	19.5	44.5	0.11	9.2	D
14	From Crossroads Blvd to Carmel Center Pl	IV	25	11.0	8.2	19.2	0.04	7.8	E
15	From Carmel Center Pl to Carmel Rancho Blvd	IV	25	29.6	8.3	37.9	0.18	17.0	C
	Total			131.7	61.1	192.8	0.77	14.3	C

Arterial Level of Service: WB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	IV	25	29.6	3.4	33.0	0.18	19.6	B
14	From Carmel Center Pl to Crossroads Blvd	IV	25	11.0	20.3	31.3	0.04	4.8	F
13	From Crossroads Blvd to SR 1	IV	25	25.0	34.3	59.3	0.11	6.9	F
5	From SR 1 to Atherton Dr	IV	25	66.1	0.0	66.1	0.43	23.5	B
	Total			131.7	58.0	189.7	0.77	14.6	C

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.

Hatch Mott MacDonald

Arterial Level of Service

Cumulative Plus Project Alt 1 PM | **Cumulative Plus Project Alt 1 PM-Miti**

Seg # Arterial Level of Service: NB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	IV	35	32.3	6.9	39.2	0.27	24.7	B	6.9	39.2	0.27	24.7	B
11	From Shopping Center Dwy to Carmel Valley Rd	IV	35	15.6	34.9	50.5	0.12	8.2	E	34.9	50.5	0.12	8.2	E
	Total	IV		47.9	41.8	89.7	0.38	15.4	C	41.8	89.7	0.38	15.4	C

Arterial Level of Service: SB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	IV	35	19.1	6.1	25.2	0.12	16.5	C	6.1	25.2	0.12	16.5	C
12	From Shopping Center Dwy to Rio Rd	IV	35	32.3	11.7	44.0	0.27	22.1	B	11.7	44.0	0.27	22.1	B
	Total	IV		51.4	17.8	69.2	0.39	20.1	B	17.8	69.2	0.39	20.1	B

Arterial Level of Service: EB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	IV	25	66.1	25.1	91.2	0.43	17.0	C	24.1	90.2	0.43	17.2	C
13	From SR 1 to Crossroads Blvd	IV	25	25.0	19.6	44.6	0.11	9.2	D	18.7	43.7	0.11	9.4	D
14	From Crossroads Blvd to Carmel Center Pl	IV	25	11.0	8.2	19.2	0.04	7.8	E	8.2	19.2	0.04	7.8	E
15	From Carmel Center Pl to Carmel Rancho Blvd	IV	25	29.6	8.3	37.9	0.18	17.0	C	8.3	37.9	0.18	17.0	C
	Total			131.7	61.2	192.9	0.77	14.3	C	59.3	191.0	0.77	14.4	C

Arterial Level of Service: WB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	IV	25	29.6	3.4	33.0	0.18	19.6	B	3.4	33.0	0.18	19.6	B
14	From Carmel Center Pl to Crossroads Blvd	IV	25	11.0	20.3	31.3	0.04	4.8	F	19.5	30.5	0.04	4.9	F
13	From Crossroads Blvd to SR 1	IV	25	25.0	34.4	59.4	0.11	6.9	F	32.4	57.4	0.11	7.1	E
5	From SR 1 to Atherton Dr	IV	25	66.1	0.0	66.1	0.43	23.5	B	0.0	66.1	0.43	23.5	B
	Total			131.7	58.1	189.8	0.77	14.6	C	55.3	187.0	0.77	14.8	C

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.
2. Arterial speed highlighted in yellow indicates project impact.

Hatch Mott MacDonald

Arterial Level of Service

Existing AM

Seg # Arterial Level of Service: NB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	IV	35	32.3	3.2	35.5	0.27	27.3	A
11	From Shopping Center Dwy to Carmel Valley Rd	IV	35	15.6	28.0	43.6	0.12	9.5	D
	Total	IV		47.9	31.2	79.1	0.38	17.5	C

Arterial Level of Service: SB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	IV	35	19.1	3.6	22.7	0.12	18.3	C
12	From Shopping Center Dwy to Rio Rd	IV	35	32.3	10.2	42.5	0.27	22.9	B
	Total	IV		51.4	13.8	65.2	0.39	21.3	B

Arterial Level of Service: EB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	IV	25	66.1	23.9	90.0	0.43	17.3	C
13	From SR 1 to Crossroads Blvd	IV	25	25.0	6.6	31.6	0.11	12.9	D
14	From Crossroads Blvd to Carmel Center Pl	IV	25	11.0	1.3	12.3	0.04	12.2	D
15	From Carmel Center Pl to Carmel Rancho Blvd	IV	25	30.1	7.7	37.8	0.17	16.1	C
	Total			132.2	39.5	171.7	0.76	15.8	C

Arterial Level of Service: WB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	IV	25	30.1	2.2	32.3	0.18	20.3	B
14	From Carmel Center Pl to Crossroads Blvd	IV	25	11.0	4.6	15.6	0.04	9.6	D
13	From Crossroads Blvd to SR 1	IV	25	25.0	30.8	55.8	0.11	7.3	E
5	From SR 1 to Atherton Dr	IV	25	79.2	0.0	79.2	0.43	19.6	B
	Total			145.3	37.6	182.9	0.77	15.1	C

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.

Arterial Level of Service

Existing + Project Alt 2 AM | **Existing + Project Alt 2 AM-Miti**

Seg # Arterial Level of Service: NB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	IV	35	32.3	3.2	35.5	0.27	27.3	A	3.2	35.5	0.27	27.3	A
11	From Shopping Center Dwy to Carmel Valley Rd	IV	35	15.6	28.0	43.6	0.12	9.5	D	28.0	43.6	0.12	9.5	D
	Total	IV		47.9	31.2	79.1	0.38	17.5	C	31.2	79.1	0.38	17.5	C

Arterial Level of Service: SB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	IV	35	19.1	3.6	22.7	0.12	18.3	C	3.6	22.7	0.12	18.3	C
12	From Shopping Center Dwy to Rio Rd	IV	35	32.3	10.2	42.5	0.27	22.9	B	10.2	42.5	0.27	22.9	B
	Total	IV		51.4	13.8	65.2	0.39	21.3	B	13.8	65.2	0.39	21.3	B

Arterial Level of Service: EB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	IV	25	66.1	23.9	90.0	0.43	17.3	C	22.9	89.0	0.43	17.5	C
13	From SR 1 to Crossroads Blvd	IV	25	25.0	6.6	31.6	0.11	12.9	D	6.6	31.6	0.11	12.9	D
14	From Crossroads Blvd to Carmel Center Pl	IV	25	11.0	1.3	12.3	0.04	12.2	D	1.3	12.3	0.04	12.2	D
15	From Carmel Center Pl to Carmel Rancho Blvd	IV	25	30.1	7.7	37.8	0.17	16.1	C	7.7	37.8	0.17	16.1	C
	Total			132.2	39.5	171.7	0.76	15.8	C	38.5	170.7	0.76	15.9	C

Arterial Level of Service: WB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	IV	25	30.1	2.2	32.3	0.18	20.3	B	2.2	32.3	0.18	20.3	B
14	From Carmel Center Pl to Crossroads Blvd	IV	25	11.0	4.6	15.6	0.04	9.6	D	4.6	15.6	0.04	9.6	D
13	From Crossroads Blvd to SR 1	IV	25	25.0	30.8	55.8	0.11	7.3	E	29.4	54.4	0.11	7.5	E
5	From SR 1 to Atherton Dr	IV	25	66.1	0.0	66.1	0.43	23.5	B	0.0	66.1	0.43	23.5	B
	Total			132.2	37.6	169.8	0.77	16.3	C	36.2	168.4	0.77	16.4	C

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.
2. Arterial speed highlighted in yellow indicates project impact.

Arterial Level of Service

Existing PM

Seg # Arterial Level of Service: NB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	IV	35	32.3	6.6	38.9	0.27	24.9	B
11	From Shopping Center Dwy to Carmel Valley Rd	IV	35	15.6	30.9	46.5	0.12	8.9	E
	Total	IV		47.9	37.5	85.4	0.38	16.2	C

Arterial Level of Service: SB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	IV	35	19.1	5.7	24.8	0.12	16.8	C
12	From Shopping Center Dwy to Rio Rd	IV	35	32.3	10.7	43.0	0.27	22.6	B
	Total	IV		51.4	16.4	67.8	0.39	20.5	B

Arterial Level of Service: EB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	IV	25	66.1	23.7	89.8	0.43	17.3	C
13	From SR 1 to Crossroads Blvd	IV	25	25.0	9.9	34.9	0.11	11.7	D
14	From Crossroads Blvd to Carmel Center Pl	IV	25	11.0	2.6	13.6	0.04	11.0	D
15	From Carmel Center Pl to Carmel Rancho Blvd	IV	25	29.6	8.1	37.7	0.18	17.1	C
	Total			131.7	44.3	176.0	0.77	15.7	C

Arterial Level of Service: WB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	IV	25	29.6	3.3	32.9	0.18	19.6	B
14	From Carmel Center Pl to Crossroads Blvd	IV	25	11.0	7.0	18.0	0.04	8.3	E
13	From Crossroads Blvd to SR 1	IV	25	25.0	31.5	56.5	0.11	7.2	E
5	From SR 1 to Atherton Dr	IV	25	66.1	0.0	66.1	0.43	23.5	B
	Total			131.7	41.8	173.5	0.77	15.9	C

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.

Arterial Level of Service

Existing + Project Alt 2 PM | **Existing + Project Alt 2 PM-Miti**

Seg # Arterial Level of Service: NB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	IV	35	32.3	6.6	38.9	0.27	24.9	B	6.6	38.9	0.27	24.9	B
11	From Shopping Center Dwy to Carmel Valley Rd	IV	35	15.6	31.0	46.6	0.12	8.9	E	31.0	46.6	0.12	8.9	E
	Total	IV		47.9	37.6	85.5	0.38	16.2	C	37.6	85.5	0.38	16.2	C

Arterial Level of Service: SB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	IV	35	19.1	5.7	24.8	0.12	16.8	C	5.7	24.8	0.12	16.8	C
12	From Shopping Center Dwy to Rio Rd	IV	35	32.3	10.7	43.0	0.27	22.6	B	10.7	43.0	0.27	22.6	B
	Total	IV		51.4	16.4	67.8	0.39	20.5	B	16.4	67.8	0.39	20.5	B

Arterial Level of Service: EB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	IV	25	66.1	23.7	89.8	0.43	17.3	C	21.9	88.0	0.43	17.7	C
13	From SR 1 to Crossroads Blvd	IV	25	25.0	10.0	35.0	0.11	11.7	D	10.0	35.0	0.11	11.7	D
14	From Crossroads Blvd to Carmel Center Pl	IV	25	11.0	2.6	13.6	0.04	11.0	D	2.6	13.6	0.04	11.0	D
15	From Carmel Center Pl to Carmel Rancho Blvd	IV	25	29.6	8.1	37.7	0.18	17.1	C	8.1	37.7	0.18	17.1	C
	Total			131.7	44.4	176.1	0.77	15.7	C	42.6	174.3	0.77	15.8	C

Arterial Level of Service: WB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	IV	25	29.6	3.3	32.9	0.18	19.6	B	3.3	32.9	0.18	19.6	B
14	From Carmel Center Pl to Crossroads Blvd	IV	25	11.0	7.0	18.0	0.04	8.3	E	7.0	18.0	0.04	8.3	E
13	From Crossroads Blvd to SR 1	IV	25	25.0	31.6	56.6	0.11	7.2	E	28.7	53.7	0.11	7.6	E
5	From SR 1 to Atherton Dr	IV	25	66.1	0.0	66.1	0.43	23.5	B	0.0	66.1	0.43	23.5	B
	Total			131.7	41.9	173.6	0.77	15.9	C	39.0	170.7	0.77	16.2	C

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.
2. Arterial speed highlighted in yellow indicates project impact.

Arterial Level of Service

Background AM

Seg # Arterial Level of Service: NB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	IV	35	32.3	3.2	35.5	0.27	27.3	A
11	From Shopping Center Dwy to Carmel Valley Rd	IV	35	15.6	29.5	45.1	0.12	9.2	D
	Total	IV		47.9	32.7	80.6	0.38	17.2	C

Arterial Level of Service: SB Carmel Rancho Blvd

		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	IV	35	19.1	3.7	22.8	0.12	18.2	C
12	From Shopping Center Dwy to Rio Rd	IV	35	32.3	10.4	42.7	0.27	22.8	B
	Total	IV		51.4	14.1	65.5	0.39	21.2	B

Arterial Level of Service: EB Rio Rd

		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	IV	25	66.1	23.9	90.0	0.43	17.3	C
13	From SR 1 to Crossroads Blvd	IV	25	25.0	7.4	32.4	0.11	12.6	D
14	From Crossroads Blvd to Carmel Center Pl	IV	25	11.0	1.4	12.4	0.04	12.1	D
15	From Carmel Center Pl to Carmel Rancho Blvd	IV	25	30.1	7.8	37.9	0.17	16.0	C
	Total			132.2	40.5	172.7	0.76	15.8	C

Arterial Level of Service: WB Rio Rd

		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	IV	25	30.1	2.2	32.3	0.18	20.3	B
14	From Carmel Center Pl to Crossroads Blvd	IV	25	11.0	4.6	15.6	0.04	9.6	D
13	From Crossroads Blvd to SR 1	IV	25	25.0	30.8	55.8	0.11	7.3	E
5	From SR 1 to Atherton Dr	IV	25	66.1	0.0	66.1	0.43	23.5	B
	Total			132.2	37.6	169.8	0.77	16.3	C

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.

Arterial Level of Service

Background + Project Alt 2 AM | **Background + Project Alt 2 AM-Miti**

Seg # Arterial Level of Service: NB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	IV	35	32.3	3.2	35.5	0.27	27.3	A	3.2	35.5	0.27	27.3	A
11	From Shopping Center Dwy to Carmel Valley Rd	IV	35	15.6	29.5	45.1	0.12	9.2	D	29.5	45.1	0.12	9.2	D
	Total	IV		47.9	32.7	80.6	0.38	17.2	C	32.7	80.6	0.38	17.2	C

Arterial Level of Service: SB Carmel Rancho Blvd

		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	IV	35	19.1	3.8	22.9	0.12	18.2	C	3.8	22.9	0.12	18.2	C
12	From Shopping Center Dwy to Rio Rd	IV	35	32.3	10.4	42.7	0.27	22.8	B	10.4	42.7	0.27	22.8	B
	Total	IV		51.4	14.2	65.6	0.39	21.2	B	14.2	65.6	0.39	21.2	B

Arterial Level of Service: EB Rio Rd

		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	IV	25	66.1	23.9	90.0	0.43	17.3	C	23.7	89.8	0.43	17.3	C
13	From SR 1 to Crossroads Blvd	IV	25	25.0	7.4	32.4	0.11	12.6	D	7.4	32.4	0.11	12.6	D
14	From Crossroads Blvd to Carmel Center Pl	IV	25	11.0	1.4	12.4	0.04	12.1	D	1.4	12.4	0.04	12.1	D
15	From Carmel Center Pl to Carmel Rancho Blvd	IV	25	30.1	7.8	37.9	0.17	16.0	C	7.8	37.9	0.17	16.0	C
	Total			132.2	40.5	172.7	0.76	15.8	C	40.3	172.5	0.76	15.8	C

Arterial Level of Service: WB Rio Rd

		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	IV	25	30.1	2.2	32.3	0.18	20.3	B	2.2	32.3	0.18	20.3	B
14	From Carmel Center Pl to Crossroads Blvd	IV	25	11.0	4.6	15.6	0.04	9.6	D	4.6	15.6	0.04	9.6	D
13	From Crossroads Blvd to SR 1	IV	25	25.0	30.8	55.8	0.11	7.3	E	29.5	54.5	0.11	7.5	E
5	From SR 1 to Atherton Dr	IV	25	66.1	0.0	66.1	0.43	23.5	B	0.0	66.1	0.43	23.5	B
	Total			132.2	37.6	169.8	0.77	16.3	C	36.3	168.5	0.77	16.4	C

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.
2. Arterial speed highlighted in yellow indicates project impact.

Arterial Level of Service

Background PM

Seg # Arterial Level of Service: NB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	IV	35	32.3	6.7	39.0	0.27	24.8	B
11	From Shopping Center Dwy to Carmel Valley Rd	IV	35	15.6	33.0	48.6	0.12	8.6	E
	Total	IV		47.9	39.7	87.6	0.38	15.8	C

Arterial Level of Service: SB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	IV	35	19.1	5.8	24.9	0.12	16.7	C
12	From Shopping Center Dwy to Rio Rd	IV	35	32.3	10.9	43.2	0.27	22.5	B
	Total	IV		51.4	16.7	68.1	0.39	20.4	B

Arterial Level of Service: EB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	IV	25	66.1	23.9	90.0	0.43	17.3	C
13	From SR 1 to Crossroads Blvd	IV	25	25.0	10.1	35.1	0.11	11.7	D
14	From Crossroads Blvd to Carmel Center Pl	IV	25	11.0	2.7	13.7	0.04	10.9	D
15	From Carmel Center Pl to Carmel Rancho Blvd	IV	25	29.6	8.1	37.7	0.18	17.1	C
	Total			131.7	44.8	176.5	0.77	15.6	C

Arterial Level of Service: WB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	IV	25	29.6	3.3	32.9	0.18	19.6	B
14	From Carmel Center Pl to Crossroads Blvd	IV	25	11.0	6.9	17.9	0.04	8.4	E
13	From Crossroads Blvd to SR 1	IV	25	25.0	31.7	56.7	0.11	7.2	E
5	From SR 1 to Atherton Dr	IV	25	66.1	0.0	66.1	0.43	23.5	B
	Total			131.7	41.9	173.6	0.77	15.9	C

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.

Arterial Level of Service

Background + Project Alt 2 PM | **Background + Project Alt 2 PM-Miti**

Seg # Arterial Level of Service: NB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	IV	35	32.3	6.7	39.0	0.27	24.8	B	6.7	39.0	0.27	24.8	B
11	From Shopping Center Dwy to Carmel Valley Rd	IV	35	15.6	33.1	48.7	0.12	8.5	E	33.1	48.7	0.12	8.5	E
	Total	IV		47.9	39.8	87.7	0.38	15.8	C	39.8	87.7	0.38	15.8	C

Arterial Level of Service: SB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	IV	35	19.1	5.8	24.9	0.12	16.7	C	5.8	24.9	0.12	16.7	C
12	From Shopping Center Dwy to Rio Rd	IV	35	32.3	10.9	43.2	0.27	22.5	B	10.9	43.2	0.27	22.5	B
	Total	IV		51.4	16.7	68.1	0.39	20.4	B	16.7	68.1	0.39	20.4	B

Arterial Level of Service: EB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	IV	25	66.1	23.9	90.0	0.43	17.3	C	22.0	88.1	0.43	17.6	C
13	From SR 1 to Crossroads Blvd	IV	25	25.0	10.2	35.2	0.11	11.6	D	10.2	35.2	0.11	11.6	D
14	From Crossroads Blvd to Carmel Center Pl	IV	25	11.0	2.7	13.7	0.04	10.9	D	2.7	13.7	0.04	10.9	D
15	From Carmel Center Pl to Carmel Rancho Blvd	IV	25	29.6	8.1	37.7	0.18	17.1	C	8.1	37.7	0.18	17.1	C
	Total			131.7	44.9	176.6	0.77	15.6	C	43.0	174.7	0.77	15.8	C

Arterial Level of Service: WB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	IV	25	29.6	3.3	32.9	0.18	19.6	B	3.3	32.9	0.18	19.6	B
14	From Carmel Center Pl to Crossroads Blvd	IV	25	11.0	7.0	18.0	0.04	8.3	E	7.0	18.0	0.04	8.3	E
13	From Crossroads Blvd to SR 1	IV	25	25.0	31.7	56.7	0.11	7.2	E	28.8	53.8	0.11	7.6	E
5	From SR 1 to Atherton Dr	IV	25	66.1	0.0	66.1	0.43	23.5	B	0.0	66.1	0.43	23.5	B
	Total			131.7	42.0	173.7	0.77	15.9	C	39.1	170.8	0.77	16.1	C

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.
2. Arterial speed highlighted in yellow indicates project impact.

Arterial Level of Service

Cumulative AM

Seg # Arterial Level of Service: NB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	IV	35	32.3	3.3	35.6	0.27	27.2	A
11	From Shopping Center Dwy to Carmel Valley Rd	IV	35	15.6	29.9	45.5	0.12	9.1	D
	Total	IV		47.9	33.2	81.1	0.38	17.1	C

Arterial Level of Service: SB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	IV	35	19.1	3.9	23.0	0.12	18.1	C
12	From Shopping Center Dwy to Rio Rd	IV	35	32.3	10.9	43.2	0.27	22.5	B
	Total	IV		51.4	14.8	66.2	0.39	21.0	B

Arterial Level of Service: EB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	IV	25	66.1	24.7	90.8	0.43	17.1	C
13	From SR 1 to Crossroads Blvd	IV	25	25.0	12.5	37.5	0.11	10.9	D
14	From Crossroads Blvd to Carmel Center Pl	IV	25	11.0	5.9	16.9	0.04	8.9	E
15	From Carmel Center Pl to Carmel Rancho Blvd	IV	25	30.1	7.8	37.9	0.17	16.0	C
	Total			132.2	50.9	183.1	0.76	14.9	C

Arterial Level of Service: WB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	IV	25	30.1	2.3	32.4	0.18	20.2	B
14	From Carmel Center Pl to Crossroads Blvd	IV	25	11.0	11.1	22.1	0.04	6.8	F
13	From Crossroads Blvd to SR 1	IV	25	25.0	31.7	56.7	0.11	7.2	E
5	From SR 1 to Atherton Dr	IV	25	66.1	0.0	66.1	0.43	23.5	B
	Total			132.2	45.1	177.3	0.77	15.6	C

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.

Arterial Level of Service

Cumulative Plus Project Alt 2 AM | **Cumulative Plus Project Alt 2 AM-Miti**

Seg # Arterial Level of Service: NB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	IV	35	32.3	3.3	35.6	0.27	27.2	A	3.3	35.6	0.27	27.2	A
11	From Shopping Center Dwy to Carmel Valley Rd	IV	35	15.6	29.9	45.5	0.12	9.1	D	29.9	45.5	0.12	9.1	D
	Total	IV		47.9	33.2	81.1	0.38	17.1	C	33.2	81.1	0.38	17.1	C

Arterial Level of Service: SB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	IV	35	19.1	3.9	23.0	0.12	18.1	C	3.9	23.0	0.12	18.1	C
12	From Shopping Center Dwy to Rio Rd	IV	35	32.3	10.9	43.2	0.27	22.5	B	10.9	43.2	0.27	22.5	B
	Total	IV		51.4	14.8	66.2	0.39	21.0	B	14.8	66.2	0.39	21.0	B

Arterial Level of Service: EB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	IV	25	66.1	24.7	90.8	0.43	17.1	C	23.9	90.0	0.43	17.3	C
13	From SR 1 to Crossroads Blvd	IV	25	25.0	12.5	37.5	0.11	10.9	D	11.2	36.2	0.11	11.3	D
14	From Crossroads Blvd to Carmel Center Pl	IV	25	11.0	5.9	16.9	0.04	8.9	E	5.9	16.9	0.04	8.9	E
15	From Carmel Center Pl to Carmel Rancho Blvd	IV	25	30.1	7.8	37.9	0.17	16.0	C	7.8	37.9	0.17	16.0	C
	Total			132.2	50.9	183.1	0.76	14.9	C	48.8	181.0	0.76	15.0	C

Arterial Level of Service: WB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	IV	25	30.1	2.3	32.4	0.18	20.3	B	2.3	32.4	0.18	20.3	B
14	From Carmel Center Pl to Crossroads Blvd	IV	25	11.0	11.2	22.2	0.04	6.8	F	10.0	21.0	0.04	7.1	E
13	From Crossroads Blvd to SR 1	IV	25	25.0	31.7	56.7	0.11	7.2	E	30.7	55.7	0.11	7.3	E
5	From SR 1 to Atherton Dr	IV	25	66.1	0.0	66.1	0.43	23.5	B	0.0	66.1	0.43	23.5	B
	Total			132.2	45.2	177.4	0.77	15.6	C	43.0	175.2	0.77	15.8	C

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.
2. Arterial speed highlighted in yellow indicates project impact.

Arterial Level of Service

Cumulative PM

Seg # Arterial Level of Service: NB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	IV	35	32.3	7.0	39.3	0.27	24.6	B
11	From Shopping Center Dwy to Carmel Valley Rd	IV	35	15.6	34.7	50.3	0.12	8.3	E
	Total	IV		47.9	41.7	89.6	0.38	15.4	C

Arterial Level of Service: SB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	IV	35	19.1	6.2	25.3	0.12	16.4	C
12	From Shopping Center Dwy to Rio Rd	IV	35	32.3	11.7	44.0	0.27	22.1	B
	Total	IV		51.4	17.9	69.3	0.39	20.0	B

Arterial Level of Service: EB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	IV	25	66.1	25.1	91.2	0.43	17.0	C
13	From SR 1 to Crossroads Blvd	IV	25	25.0	19.5	44.5	0.11	9.2	D
14	From Crossroads Blvd to Carmel Center Pl	IV	25	11.0	8.2	19.2	0.04	7.8	E
15	From Carmel Center Pl to Carmel Rancho Blvd	IV	25	29.6	8.3	37.9	0.18	17.0	C
	Total			131.7	61.1	192.8	0.77	14.3	C

Arterial Level of Service: WB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	IV	25	29.6	3.4	33.0	0.18	19.6	B
14	From Carmel Center Pl to Crossroads Blvd	IV	25	11.0	20.3	31.3	0.04	4.8	F
13	From Crossroads Blvd to SR 1	IV	25	25.0	34.3	59.3	0.11	6.9	F
5	From SR 1 to Atherton Dr	IV	25	66.1	0.0	66.1	0.43	23.5	B
	Total			131.7	58.0	189.7	0.77	14.6	C

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.

Arterial Level of Service

Cumulative Plus Project Alt 2 PM | **Cumulative Plus Project Alt 2 PM-Miti**

Seg # Arterial Level of Service: NB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
12	From Rio Rd to Shopping Center Dwy	IV	35	32.3	6.9	39.2	0.27	24.7	B	6.9	39.2	0.27	24.7	B
11	From Shopping Center Dwy to Carmel Valley Rd	IV	35	15.6	34.9	50.5	0.12	8.2	E	34.9	50.5	0.12	8.2	E
	Total	IV		47.9	41.8	89.7	0.38	15.4	C	41.8	89.7	0.38	15.4	C

Arterial Level of Service: SB Carmel Rancho Blvd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
11	From Carmel Valley Rd to Shopping Center Dwy	IV	35	19.1	6.1	25.2	0.12	16.5	C	6.1	25.2	0.12	16.5	C
12	From Shopping Center Dwy to Rio Rd	IV	35	32.3	11.7	44.0	0.27	22.1	B	11.7	44.0	0.27	22.1	B
	Total	IV		51.4	17.8	69.2	0.39	20.1	B	17.8	69.2	0.39	20.1	B

Arterial Level of Service: EB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
5	From Atherton Dr to SR 1	IV	25	66.1	25.1	91.2	0.43	17.0	C	24.1	90.2	0.43	17.2	C
13	From SR 1 to Crossroads Blvd	IV	25	25.0	19.5	44.5	0.11	9.2	D	18.7	43.7	0.11	9.4	D
14	From Crossroads Blvd to Carmel Center Pl	IV	25	11.0	8.2	19.2	0.04	7.8	E	8.2	19.2	0.04	7.8	E
15	From Carmel Center Pl to Carmel Rancho Blvd	IV	25	29.6	8.3	37.9	0.18	17.0	C	8.3	37.9	0.18	17.0	C
	Total			131.7	61.1	192.8	0.77	14.3	C	59.3	191.0	0.77	14.4	C

Arterial Level of Service: WB Rio Rd

Seg #		Arterial Class	Flow Speed	Running Time	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS	Control Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
15	From Carmel Rancho Blvd to Carmel Center Pl	IV	25	29.6	3.4	33.0	0.18	19.6	B	3.4	33.0	0.18	19.6	B
14	From Carmel Center Pl to Crossroads Blvd	IV	25	11.0	20.3	31.3	0.04	4.8	F	19.5	30.5	0.04	4.9	F
13	From Crossroads Blvd to SR 1	IV	25	25.0	34.4	59.4	0.11	6.9	F	32.4	57.4	0.11	7.1	E
5	From SR 1 to Atherton Dr	IV	25	66.1	0.0	66.1	0.43	23.5	B	0.0	66.1	0.43	23.5	B
	Total			131.7	58.1	189.8	0.77	14.6	C	55.3	187.0	0.77	14.8	C

Notes:

1. Level of service highlighted in red indicates LOS exceeds LOS standard.
2. Arterial speed highlighted in yellow indicates project impact.