Attachment G

COUNTY OF MONTEREY

PUBLIC WORKS, FACILITIES & PARKS

VOLUME TWO OF TWO

GENERAL REQUIREMENTS AND SPECIFICATIONS

13993 SHERMAN BLVD - EAST GARRISON LIBRARY
PROJECT NO. 4112
BID NO. 10978

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SECTION 01 11 00

SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Work covered by Contract Documents.
2. Contract Provisions.
3. Access to site.
4. Work restrictions.
5. Specification and drawing conventions.
6. Miscellaneous Provisions.

B. Related Requirements:

1. Section 01 50 00, "Temporary Facilities and Controls," for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

A. Project Description: New single story public library building and associated site improvements.

B. Project Location: 13993 Sherman Boulevard, Marina CA 93933

C. Owner: County of Monterey

168 W. Alisal Street, Salinas, CA 93901

Contact: Andrei F. Petrutiu
Phone: 831-755-8964
Email: petrutiua@countyofmonterey.gov

D. Architect: Wald, Ruhnke & Dost Architects, LLP.

2340 Garden Road, Suite 100, Monterey, CA 93940

Contact: Chris Barlow
Phone: 831-649-4642
Email: christopherb@wrdarch.com

E. Type of Contract:

1. Project will be constructed under a single prime construction contract.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. Work of this Contract consists of a new single-story public library building and associated site improvements at the corner of East Garrison and Sherman Blvd., East Garrison, CA 93933, as further shown and described in the Drawings and other Contract Documents.

1. Building Area = 4,256 s.f.
2. Lot Size = 0.565 acres = 24,643 s.f.
3. APN = 031-164-130-000

B. The Work specifically includes all work as represented by the Drawings and Specifications issued for site demolition, construction, and subsequently approved revisions and addenda.

C. If certain features are not fully shown or called for on the Drawings, their construction shall be of the same character, quality and level of performance as for similar conditions that are shown, called for, or reasonably inferred.

D. Provide all labor, equipment, and materials required to provide complete, properly operating, and safe building.

1. The extent of the Work, as shown on the Drawings and as described in the Specifications, shall include all that may be reasonably inferred to be required for proper execution or installation of Work and for complete systems.
2. If certain features are not fully shown or called for on the Drawings, their construction shall be of the same character, quality, and level of performance as for similar conditions that are shown, called for, or reasonably inferred.

E. The Drawings shall be recognized as diagrammatic in nature and not completely descriptive of all requirements for construction. Whatever Work that may be specified and not drawn or drawn and not specified shall be executed as fully as if described in both these ways. And, should any workmanship or material be necessary that is not either directly or indirectly noted in these Specifications or shown on the Drawings but is nevertheless necessary for properly carrying out the obvious intention thereof, Contractor shall understand it to be implied and shall provide for the same as fully as if it were particularly described or delineated.

1.5 DEVIATIONS AND DISCREPANCIES

A. Should the Contract Documents contradict themselves, Contractor shall provide the more stringent or higher quality or quantity, unless otherwise accepted by Owner.

B. Deviations from or discrepancies to the Drawings, Specifications, and/or submittal requirements shall be brought to the immediate attention of Architect in writing with sufficient details to permit proper analysis. This notification shall be made prior to the continuation or performance of any additional work.

1.6 DEFERRED APPROVAL AND DESIGN-BUILD ITEMS

A. Permits for Deferred Approval and Design Build (Delegated Design) items are the responsibility of the Contractor.

1. Where Drawings and/or Specifications exist for Deferred Approval and Design-Build items, such Drawings and Specifications represent only a general outline of the work required of the Contractor. The actual scope of work shall be as determined by all entities having jurisdiction.
2. The Contractor shall verify the scope of work and permits required for all Deferred Approval and Design-Build items with all entities having jurisdiction and shall include all costs associated with such permits and work in the Contractor's fee. If the scope of work required by all entities having jurisdiction is less than or different from the scope outlined in the Contract Documents, the Contractor shall include the greater scope in their fee or bring the discrepancy to the Architect's attention before providing a proposed fee. If the scope of work required by the entities having jurisdiction is greater than the scope outlined in the Contract Documents, the Contractor is responsible for the required scope of work at no additional cost to the Owner.
3. The Contractor is responsible for obtaining the stamps and signatures of qualified engineers as required by all agencies having jurisdiction over the Deferred Approval and Design-Build items.

B. The Contractor or Contractor's subcontractor shall have a minimum of five years of continuous experience with the type of work included in the Deferred Approval and Design-Build items on projects in the same jurisdiction and of similar type and size to this Project.

C. Deferred submittal items include the following:

1. Fire sprinkler design drawings, specifications, and supporting calculations in accordance with NFPA 13.
2. Fire alarm design drawings and specifications in accordance with NFPA 72.
3. Photovoltaic (PV) Design and attachment to structure.
4. Prefabricated Wood Roof Trusses.

D. Design-build items, if applicable, are noted on the Drawings and/or the Specifications.

1.7 FIELD CONDITIONS

A. Verify existing conditions and proposed dimensions before commencing Work.

1. Determine dimensions where necessary.
2. Immediately notify Architect of any discrepancies and, until they are resolved, do not proceed with affected work.

B. Archeological Discovery.

1. If archeological remains are uncovered, work at the place of discovery shall be halted immediately until a qualified archeologist can evaluate the finds and suggest appropriate mitigation measures.

2. If human remains are encountered, excavation or disturbance of the location must be halted in the vicinity of the find, and the County Coroner contacted. If the Coroner determines the remains are Native American, the Coroner will contact the Native American Heritage Commission for identification of the person or persons believed to be most likely descended from the deceased Native American. The most likely descendent shall make recommendations regarding treatment of the remains with appropriate dignity.

C. Additional requirements of all parties to the Contract are included in the Contract Forms and Conditions of the Contract.

1.8 HAZARDOUS MATERIALS

A. If any miscellaneous hazardous materials are encountered during selective site demolition and earth moving operations, immediately notify the Owner's Representative.

B. Do not disturb any material suspected of containing a hazardous material. The Owner will arrange to have any hazardous materials encountered removed under separate contract.

1.9 DEFINITIONS

A. The following definitions apply to the language used in these Specifications.

B. The term "Owner" refers to the County of Monterey.

C. The term "Architect" refers to the firm of Wald, Ruhnke & Dost Architects, LLP.

D. The term "Contractor" refers to the General Contractor.

E. Where the term "General Conditions" is used, it shall mean "General Conditions of the Contract for Construction."

F. Where the term "Agreement" is used, it shall mean "Agreement between Owner and Contractor."

G. Where the terms, "Plumbing Contractor," "Electrical Contractor," or instances of similar terminology are used, it is for convenience only and shall in no way affect the overall responsibility of the General Contractor.

H. Where the terms "as required" and "required" are used, it shall mean "to meet the Contract Documents, to meet Code requirements, to meet good building practice, to meet the condition prevailing, to meet performance requirements, and to provide complete systems and installations."

1.10 SPECIFICATION AND DRAWING CONVENTIONS

A. The General Conditions, Supplementary Conditions, and Division 01, “General Requirements,” apply to the Work of all Sections.

B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations as scheduled on Drawings.

1.11 LISTING OF RELATED WORK

A. Listings of related requirements in the various Specification Sections are not complete listings. These listings are provided for information and convenience only and are intended to highlight related or similar work specified in other Sections. Related work listings and omissions from such listings are not intended to control the Contractor in dividing the Work among subcontractors or in establishing the extent of the Work to be performed by any trade.

1.12 CONTRACTOR'S USE OF SITE

A. General: Contractor shall have full use of the premises for the execution of the Work, either exclusively or in conjunction with others performing other construction as part of the Project, within the legal description of the site. Use of additional spaces outside of the Owner’s property lines shall be arranged for by the Contractor at its own expense.

B. Use of Site: Limit use of Project site to areas of work only. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Driveways, Walkways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

1.13 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on the use of public streets and with other requirements of authorities having jurisdiction.

B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify Owner not less than two days in advance of proposed utility interruptions.
2. Obtain Owner's written permission before proceeding with utility interruptions.

C. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

1. Notify Owner not less than two days in advance of proposed utility interruptions.
2. Obtain Owner's written permission before proceeding with utility interruptions.

D. On-Site Work Hours: Limit work in the existing building to normal business working hours of 7 a.m. to 5 p.m., Monday through Friday, unless otherwise indicated.

1.14 OWNER OCCUPANCY

A. The Contractor shall allow, subject to City approval, the Owner to take possession of and use any completed or partially completed portion of the structures during the progress of the Work as soon as is possible without interference to the Work. Contractor shall not be responsible for damages caused by Owner or others outside of Contractor's control. Inspect areas to verify existing conditions prior to Owner's occupancy.

B. Possession, use of structure or Work, and placing and installation of equipment by Owner shall not in any way evidence the completion of the Work or any part of it.

END OF SECTION 01 11 00

SECTION 01 25 00

SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:

1. Section 00 26 00, “Procurement Substitution Procedures,” for changes in products, materials, equipment, and methods of construction from those indicated, submitted prior to receipt of bids.
2. Section 01 60 00, "Product Requirements," for requirements for submitting comparable product submittals for products by listed manufacturers.

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use CSI Form 13.1A.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.

b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. Substitution request is fully documented and properly submitted.
c. Requested substitution will not adversely affect Contractor's construction schedule.
d. Requested substitution has received necessary approvals of authorities having jurisdiction.
e. Requested substitution is compatible with other portions of the Work.
f. Requested substitution has been coordinated with other portions of the Work.
g. Requested substitution provides specified warranty.
h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Not allowed unless otherwise indicated.

C. Substitutions for Convenience: Architect will consider requests for substitution if received within 30 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities
b. Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
c. Requested substitution does not require extensive revisions to the Contract Documents.
d. Requested substitution is consistent with the Contract Documents and will produce indicated results.
e. Substitution request is fully documented and properly submitted.
f. Requested substitution will not adversely affect Contractor's construction schedule.

g. Requested substitution has received necessary approvals of authorities having jurisdiction.
h. Requested substitution is compatible with other portions of the Work.
i. Requested substitution has been coordinated with other portions of the Work.
j. Requested substitution provides specified warranty.
k. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 25 00

SECTION 01 26 00

CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

B. Related Requirements:

1. Section 01 25 00, "Substitution Procedures," for administrative procedures for handling requests for substitutions made after the Contract award.

1.3 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time.

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
2. Within 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

    a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    c. Include costs of labor and supervision directly attributable to the change.
    d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 01 25 00, "Substitution Procedures," if the proposed change requires substitution of one product or system for product or system specified.

1.5 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Changes Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

B. Overhead and profit on Change Orders may not exceed the percentages for overhead and profit listed on the Schedule of Values.

1.6 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 26 00

SECTION 01 26 13

REQUESTS FOR INTERPRETATION

1.1 SUMMARY

A. Section Includes: Procedures for processing of Contractors “Requests for Interpretation” (RFI) questions.

1.2 PREPARATION AND SUBMISSION

A. Questions from the Contractor shall be submitted in written form as a “Request for Interpretation” or “RFI.”

B. Subcontractors shall submit their request to the Contractor, who shall, make a diligent effort to answer the question from contractors overall knowledge of the Project, the Contract and the Construction Documents.

C. If Contractor finds that he cannot answer the subcontractor’s request, Contractor shall prepare a written RFI. Each RFI shall be given a discrete, consecutive number such as “001,” “002,” “003,” etc. Revisions or resubmittal of the same RFI shall maintain the original RFI number but be otherwise identified with a suffix such as “001A” for first revisions, “001B” for second revision, etc.

D. RFI’s shall contain Contractor’s interpretation or proposed answer in the RFI, and/or may contain a proposed alternate solution to the issue. In addition, each RFI shall state if the proposed interpretation or alternate solution involves a change to the Contract amount or schedule.

E. RFIs shall be submitted by Contractor to Architect for review and/or distribution.

F. Contractor shall maintain a log of RFIs which shall indicate each RFI’s status. Log shall be maintained current and shall be distributed at each regular jobsite meeting of Contractor and Architect.

1.3 RESPONSE TO RFI’S

A. Responses to RFIs will be in writing and will be submitted to Contractor in a timely manner.

1. Architect shall respond to the RFI by stating its concurrence with Contractor’s proposed answer or alternate solution or by stating its interpretation, which shall be consistent with the design intent of the Drawings.
2. Architect may furnish an alternate solution for Contractor’s consideration.
3. Architect may submit proposed answers and/or alternate solutions to any of the consultants for review prior to responding to Contractor.
4. Architect may submit proposed answers and/or alternate solutions to Owner for approval prior to responding to Contractor.
5. Architect shall indicate, for the benefit of Owner, whether the time expended in providing alternative solutions is billable time under the Construction Phase of the Owner-Architect agreement.

B. Each RFI, and the Architect's response thereto, shall become a part of the Contract Documents and, unless specifically indicated otherwise, shall not change the Contract amount or schedule. It is Contractor's responsibility to obtain Owner's approval for any change to the Contract amount or schedule.

C. To the extent that Architect's response to RFI's changes, modifies, or amends any portion of the Contract Documents the response shall be deemed sufficient. Revised Contract Documents will not be issued unless the RFI response is insufficient in providing direction to Contractor. Whenever possible, revised contract documents will be issued in 8-1/2 by 11 inches or 11 by 17 inch size suitable for inclusion with the response to the RFI.

D. The Contractor shall allow an average of 5 working days for Architect to review and process RFIs. It is acknowledged and understood that some RFIs will take a longer or shorter time to answer.

END OF SECTION 01 26 13

SECTION 01 31 00

PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General coordination procedures.
2. Coordination drawings.
3. Requests for Information (RFIs).
4. Project meetings.

B. Related Requirements:

1. Section 01 32 00, "Construction Progress Documentation," for preparing and submitting Contractor's construction schedule.
2. Section 01 73 00, "Execution," for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
3. Section 01 77 00, "Closeout Procedures," for coordinating closeout of the Contract.

1.3 DEFINITIONS

A. RFI: Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Use CSI Form 1.5A. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.

B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Post copies of list in project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

1.6 REQUESTS FOR INFORMATION (RFIS)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.

2. Project number.
3. Date.
4. Name of Contractor.
5. RFI number, numbered sequentially.
6. RFI subject.
7. Specification Section number and title and related paragraphs, as appropriate.
8. Drawing number and detail references, as appropriate.
9. Field dimensions and conditions, as appropriate.
10. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
11. Contractor's signature.
12. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

    a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Architect.

1. Attachments shall be electronic files in Adobe Acrobat PDF format.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.

1. The following Contractor-generated RFIs will be returned without action:

    a. Requests for approval of submittals.
    b. Requests for approval of substitutions.
    c. Requests for approval of Contractor's means and methods.
    d. Requests for coordination information already indicated in the Contract Documents.
    e. Requests for adjustments in the Contract Time or the Contract Sum.
    f. Requests for interpretation of Architect's actions on submittals.
    g. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 01 26 00, "Contract Modification Procedures."

    a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Software log with not less than the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number including RFIs that were returned without action or withdrawn.

5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.

F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

1.7 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, and Architect, within three days of the meeting.

B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.

1. Conduct the conference to review responsibilities and personnel assignments.
2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect progress, including the following:

a. Tentative construction schedule.
b. Phasing.
c. Critical work sequencing and long-lead items.
d. Designation of key personnel and their duties.
e. Lines of communications.
f. Procedures for administering Contract Administration including the processing Change Orders, Architect’s Supplemental Instructions, Shop Drawings, Submittals, and RFI’s.
g. Procedures for testing and inspecting.
h. Procedures for processing Applications for Payment and Cost Certification.
i. Distribution of the Contract Documents.
j. Procedures for Substantial Completion.
k. Preparation of record documents.
l. Use of the premises.
m. Work restrictions.
n. Working hours.
o. Owner's occupancy requirements.
p. Responsibility for temporary facilities and controls.
q. Procedures for moisture and mold control.

r. Procedures for disruptions and shutdowns.
s. Construction waste management and recycling.
t. Parking availability.
u. Office, work, and storage areas.
v. Equipment deliveries and priorities.
w. First aid.
x. Security.
y. Progress cleaning.

4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect, of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

a. Purchases.
b. Deliveries.
c. Submittals.
d. Possible conflicts.
e. Compatibility requirements.
f. Time schedules.
g. Manufacturer's written instructions.
h. Compatibility of materials.
i. Acceptability of substrates.
j. Space and access limitations.
k. Testing and inspecting requirements.
l. Installation procedures.
m. Coordination with other work.
n. Required performance results.
o. Protection of adjacent work.
p. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion.

1. Conduct the conference to review requirements and responsibilities related to Project closeout.

2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:

    a. Preparation of record documents.
    b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
    c. Submittal of written warranties.
    d. Requirements for preparing operations and maintenance data.
    e. Requirements for delivery of material samples, attic stock, and spare parts.
    f. Requirements for demonstration and training.
    g. Preparation of Contractor's punch list.
    h. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
    i. Submittal procedures.
    j. Responsibility for removing temporary facilities and controls.

4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

E. Progress Meetings: Conduct progress meetings at weekly or regular intervals.

1. Coordinate dates of meetings with preparation of payment requests.
2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

    a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

        1) Review schedule for next period.

    b. Review present and future needs of each entity present, including the following:

        1) Interface requirements.
        2) Sequence of operations.
        3) Status of submittals.
        4) Deliveries.
        5) Off-site fabrication.
        6) Access.
        7) Site utilization.
        8) Temporary facilities and controls.
        9) Progress cleaning.
        10) Quality and work standards.
        11) Status of correction of deficient items.
        12) Field observations.
        13) Status of RFIs.
        14) Status of proposal requests.
        15) Pending changes.

16) Status of Change Orders.
17) Pending claims and disputes.
18) Documentation of information for payment requests.

3. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00

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SECTION 01 32 00

CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Contractor's construction schedule and reports.

B. Related Requirements:

1. Section 01 33 00, "Submittal Procedures," for submitting schedules and reports.
2. Section 01 40 00, "Quality Requirements," for submitting a schedule of tests and inspections.

1.3 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

1. Working electronic copy of schedule file, where indicated.
2. Two paper copies.

B. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

1.4 COORDINATION

A. Coordinate Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.
3. Construction progress documentation shall be available to the Architect and Owner for review and for their documentation as required.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's construction schedule within 30 days of date established for commencement of the Work. Base schedule on the startup construction schedule and additional information received since the start of Project.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

C. Time Frame: Extend schedule from date established for commencement of the Work to final completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Work Stages: Indicate important stages of construction for each major portion of the Work.

E. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.

F. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis to demonstrate the effect of the proposed change on the overall project schedule.

G. Daily Construction Reports: Prepare a daily construction report recording events at Project site, including list of subcontractors; high and low temperatures and general weather conditions; accidents; stoppages, delays, shortages, and losses; meter readings; orders and requests of authorities having jurisdiction; and equipment or system tests and startups.

H. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare a detailed report. Submit with a request for information on CSI Form 13.2A or Contractor’s standard form. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

I. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:

1. Unresolved issues.
2. Unanswered Requests for Information.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.
5. Pending modifications affecting the Work and Contract Time.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate final completion percentage for each activity.

B. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 01 32 00

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SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Requirements:

1. Section 01 32 00, "Construction Progress Documentation," for submitting schedules and reports, including Contractor's construction schedule.
2. Section 01 78 23, "Operation and Maintenance Data," for submitting operation and maintenance manuals.
3. Section 01 78 39, "Project Record Documents," for submitting record Drawings, record Specifications, and record Product Data.
4. All relevant sections for specific requirements regarding submittals.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.

1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings.

a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.

b. Digital Drawing Software Program: The Contract Drawings are available in AutoCAD DWG format.
c. Contractor shall execute a data licensing agreement with Architect prior to the release of the electronic digital files.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 15 days for review of each resubmittal.
4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.

D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 6 by 8 inches (150 by 200 mm) on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
3. Include the following information for processing and recording action taken:

a. Project name.
b. Date.
c. Name of Architect.
d. Name of Contractor.
e. Name of subcontractor.
f. Name of supplier.
g. Name of manufacturer.
h. Submittal number or other unique identifier, including revision identifier.

1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 06 10 00.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 06 10 00.01.A).

i. Number and title of appropriate Specification Section.
j. Drawing number and detail references, as appropriate.
k. Location(s) where product is to be installed, as appropriate.
l. Other necessary identification.

4. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.

5. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will not review submittals received from sources other than Contractor.

a. Transmittal Form for Paper Submittals: Provide locations on form for the following information:

1) Project name.
2) Date.
3) Destination (To:).
4) Source (From:).
5) Name and address of Architect.
6) Name of Construction Manager.
7) Name of Contractor.
8) Name of firm or entity that prepared submittal.
9) Names of subcontractor, manufacturer, and supplier.
10) Category and type of submittal.
11) Submittal purpose and description.
12) Specification Section number and title.
13) Specification paragraph number or drawing designation and generic name for each of multiple items.
14) Drawing number and detail references, as appropriate.
15) Indication of full or partial submittal.
16) Transmittal number.
17) Submittal and transmittal distribution record.
18) Remarks.
19) Signature of transmitter.

E. Options: Identify options requiring selection by Architect.

F. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

I. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Action Submittals: Submit three paper copies of each submittal unless otherwise indicated. Architect, will return two copies.
2. Informational Submittals: Submit two paper copies of each submittal unless otherwise indicated. Architect will not return copies.
3. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

a. Manufacturer's catalog cuts.
b. Manufacturer's product specifications.
c. Standard color charts.
d. Statement of compliance with specified referenced standards.
e. Testing by recognized testing agency.
f. Application of testing agency labels and seals.
g. Notation of coordination requirements.
h. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:

a. Wiring diagrams showing factory-installed wiring.
b. Printed performance curves.

c. Operational range diagrams.
d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before or concurrent with Samples.
6. Submit Product Data in the following format:

a. Three paper copies of Product Data unless otherwise indicated. Architect, will return two copies.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal based on Architect's digital data drawing files is otherwise permitted.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

a. Identification of products.
b. Schedules.
c. Compliance with specified standards.
d. Notation of coordination requirements.
e. Notation of dimensions established by field measurement.
f. Relationship and attachment to adjoining construction clearly indicated.
g. Seal and signature of professional engineer if specified.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm), but no larger than 30 by 42 inches (750 by 1067 mm).
3. Submit Shop Drawings in the following format:

a. Three opaque copies of each submittal. Architect will retain two copies; remainder will be returned.
b. Prepare Shop Drawings in PDF format.
c. Refer to Section 01 31 00, "Project Management and Coordination," for requirements for coordination drawings.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:

a. Generic description of Sample.
b. Product name and name of manufacturer.
c. Sample source.
d. Number and title of applicable Specification Section.
e. Specification paragraph number and generic name of each item.

3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

    a. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

    a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect, will return submittal with options selected.

5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

    a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned.

        1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
        2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

6. Submit product schedule in the following format:

    a. Three paper copies of product schedule or list unless otherwise indicated. Architect, will return two copies.

E. Coordination Drawing Submittals: Comply with requirements specified in Section 01 31 00, "Project Management and Coordination."

F. Contractor's Construction Schedule: Comply with requirements specified in Section 01 32 00, "Construction Progress Documentation."

G. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 01 40 00, "Quality Requirements."

H. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 01 77 00, "Closeout Procedures."

I. Maintenance Data: Comply with requirements specified in Section 01 78 23, "Operation and Maintenance Data."

J. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

K. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

L. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

M. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

N. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

O. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

P. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

Q. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

R. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

1. Name of evaluation organization.
2. Date of evaluation.
3. Time period when report is in effect.
4. Product and manufacturers' names.
5. Description of product.
6. Test procedures and results.
7. Limitations of use.

S. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

T. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

U. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

V. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Project Closeout and Maintenance Material Submittals: See requirements in Section 01 77 00, "Closeout Procedures."

1. Stamp each submittal with a uniform, approval stamp.
2. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
3. All submittals received by the Architect shall be considered reviewed, checked, and approved by the Contractor for compliance with the Contract Documents.
4. The Contractor shall not be relieved of responsibility for reviewing, checking, and approving submittals for compliance with Contract Documents by using exculpatory language of any kind on an approval stamp or a review stamp.
5. Submittals received by the Architect that do not bear an approval stamp or bears an approval stamp or a review stamp with exculpatory language of any kind shall be considered reviewed, checked, and approved by the Contractor for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

A. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.

B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect and will forward each submittal to appropriate party.

C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Submittals not required by the Contract Documents may be returned by the Architect without action.

END OF SECTION 01 33 00

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SECTION 01 40 00

QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
4. Specific test and inspection requirements are not specified in this Section.

1.3 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 INFORMATIONAL SUBMITTALS

A. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

B. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.

2. Entity responsible for performing tests and inspections.
3. Description of test and inspection.
4. Identification of applicable standards.
5. Identification of test and inspection methods.
6. Number of tests and inspections required.
7. Time schedule or time span for tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

1.6 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.7 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. HUD Special Conditions:
1. Certificates: When required by Contract Documents. Submit Certificate of Compliance or Manufacturer’s Certificate that materials or workmanship, or both comply with requirement of referenced standard.
2. Labels: Where labels indicating certification is specified, deliver and install products with labels intact. Do not remove labels.

C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

E. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

F. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to [ASTM E 329] <Insert standard>; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

G. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:

a. Provide test specimens representative of proposed products and construction.
b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
f. When testing is complete, remove test specimens, assemblies, and mockups and laboratory mockups; do not reuse products on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

J. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at Project.
4. Demonstrate the proposed range of aesthetic effects and workmanship.
5. Obtain Architect's approval of mockups before starting work, fabrication, or construction.

    a. Allow seven days for initial review and each re-review of each mockup.

6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
7. Demolish and remove mockups when directed unless otherwise indicated.

1.8 QUALITY CONTROL

A. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

B. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."

C. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

E. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Preliminary design mix proposed for use for material mixes that require control by testing agency.
6. Security and protection for samples and for testing and inspecting equipment at Project site.

G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

H. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.

1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.9 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, as indicated in ‘Statement of Special Inspections,’ and as follows:

B. Special Tests and Inspections: Conducted by a qualified testing agency as required by authorities having jurisdiction, as indicated in individual Specification Sections and in ‘Statement of Special Inspections,’ and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.

3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

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SECTION 01 45 20

CONCRETE MOISTURE TESTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Testing for Moisture Vapor Emission Rate (MVER) and alkalinity at concrete floors scheduled to receive applied floor coverings.

B. Related Requirements:

1. Section 03 30 00, “Cast-in-Place Concrete.”
2. Section 09 65 00, “Resilient Flooring.”

1.3 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

1.4 INFORMATIONAL SUBMITTALS

A. Qualifications of personnel or laboratory to perform testing.

B. Results of substrate moisture testing for each location and maximum allowable levels specified in respective Specification Sections for the intended floor finish.

1.5 QUALITY ASSURANCE

A. If areas of concrete are not within the floor covering manufacturer's maximum allowable emission rate and slab area fails the moisture test, do not proceed with installation and notify the Architect.

1.6 FIELD CONDITIONS

A. Ambient Conditions:

1. Area to be tested shall match that of the finished floor covering.
2. Spaces shall be conditioned to temperature and humidity levels expected for final Owner occupancy or as follows:

a. Interior temperature shall be 75 degrees F, plus or minus 10 degrees F.
b. Relative humidity shall be 50 percent, plus or minus 10 percent.

3. Maintain the above conditions for 48 hours prior to and throughout the duration of the tests.

PART 2 - PRODUCTS

2.1 MATERIALS FOR TEST PROCEDURES

A. MVER Tests:

1. Calcium Chloride Test Kits: Pre-packaged and of commercial consistency; American Moisture Test, Inc., Irvine, CA, Taylor Tools, or accepted equal. Kit shall include sealed dish of anhydrous calcium chloride, a metering dome with gasket, and instructions.
2. Relative humidity (RH) probe that has been verified for accuracy within the past year.

B. Alkalinity Tests: Test kit by American Moisture Test, Inc., Irvine, CA, Taylor Tools, or accepted equal pH meter.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean concrete surfaces of any residues resulting from pour of concrete which will affect the moisture vapor drive.

B. Plastic dome of test kit shall be sealed airtight to prevent ambient humidity from influencing the test results.

3.2 TESTING

A. General:

1. Perform moisture tests based on the Moisture Vapor Emission Rate (MVER) content in accordance with ASTM F1869, relative humidity tests in accordance with ASTM F2170, and alkalinity tests in accordance with ASTM F710, on concrete subfloors. Results of these tests will be used to determine suitability of substrate to receive flooring materials.
2. Number of tests shall be determined by the square footage of each flooring material. Provide minimum of three tests for the first 1,000 square feet (93 square meters), and one test kit per each additional 1,000 square feet (93 square meters), with consideration to separation of test areas.

3. Results of these tests will be used to determine suitability of substrate to receive flooring materials.

B. MVER Test Kit:

1. Verify temperature of slab is up to service temperature.
2. Duration of MVER test shall be 60 to 72 hours.
3. Dish shall be measured one-hour before and one-hour after testing with weight calculated within 0.1 grams.
4. Where calcium chloride test results are satisfactory but there is reason to suspect that unacceptable moisture levels below the upper two centimeters of the concrete may still exist, a relative humidity probe shall be used to test the full depth of the slab.

C. RH Probe:

1. Verify concrete slabs are up to service temperature at least 48 hours prior to testing.
2. Depth of probes shall be 40 percent on slabs drying from the top only and 20 percent for slabs drying from both sides.
3. Probe shall be allowed to acclimate and checked for drift less than 1 percent relative humidity over a 5 minute period.
4. Elapsed time for test shall be 48 hours.

D. Where tests are not satisfactory and substrates exceed the moisture vapor and alkalinity limits required by floor material manufacturers, do not proceed with installation. Notify Architect for review of conditions and to determine a resolution acceptable to the Architect and Owner including application of a topical barrier coat.

END OF SECTION 01 45 00

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SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Requirements:

1. Section 01 10 00, "Summary," for work restrictions and limitations on utility interruptions.

1.3 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Architect, testing agencies, and authorities having jurisdiction.

B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

C. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.4 INFORMATIONAL SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

B. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

C. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.

1. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.
2. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
3. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.

1.5 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.6 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch-thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch-OD line posts and 2-7/8-inch-OD corner and pull posts, with 1-5/8-inch-OD top and bottom rails. Provide galvanized-steel bases for supporting posts.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:

1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot-square tack and marker boards.
3. Drinking water and private toilet.
4. Coffee machine and supplies.

5. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
6. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

C. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

E. Heating: Provide temporary heating required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.

G. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.
1. Connect temporary service to Owner's existing power source, as directed by Owner.

H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
2. Install lighting for Project identification sign.

I. Electronic Communication Service: Provide a desktop computer in the primary field office adequate for use by Architect and Owner to access Project electronic documents and maintain electronic communications.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

C. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.

1. Identification Signs: Provide Project identification signs as indicated on Drawings.
2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.

D. Waste Disposal Facilities: Comply with requirements specified in Section 01 74 19, "Construction Waste Management and Disposal."

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Section 01 10 00, "Summary."

C. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

D. Enclosure Fence: Before construction operations begin, furnish and install enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.

1. Extent of Fence: As required to enclose portion of site determined sufficient to accommodate construction operations.

E. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.

F. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.

G. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

H. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

I. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

J. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.

1. Prohibit smoking in construction areas.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.

B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:

1. Protect porous materials from water damage.
2. Protect stored and installed material from flowing or standing water.
3. Keep porous and organic materials from coming into prolonged contact with concrete.
4. Remove standing water from decks.
5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Periodically collect and remove waste containing cellulose or other organic matter.
4. Discard or replace water-damaged material.
5. Do not install material that is wet.
6. Discard, replace, or clean stored or installed material that begins to grow mold.
7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:

1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Use permanent HVAC system to control humidity.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.

    a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective.
    b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
    c. Remove materials that can not be completely restored to their manufactured moisture level within 48 hours.

3.6 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 77 00, "Closeout Procedures."

END OF SECTION 01 50 00

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SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Condition s and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Requests for changes in products, materials, equipment, and methods of construction from those indicated or specified shall be submitted prior to receipt of bids under conditions in Section 00 26 00, "Procurement Substitution Procedures."

C. Related Requirements:
   1. Section 00 26 00, “Procurement Substitution Procedures” for changes in products, materials, equipment, and methods of construction from those indicated, submitted prior to receipt of bids.
   2. Section 01 25 00, "Substitution Procedures" for requests for substitutions.

1.3 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

   1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
   2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
   3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.4 ACTION SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

    a. Form of Approval: As specified in Section 01 33 00, "Submittal Procedures."
    b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 01 33 00, "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.

4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 01 77 00, "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
3. Products:

    a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.

4. Manufacturers:

    a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.

5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 01 25 00, "Substitution Procedures" for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.

2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 60 00

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SECTION 01 73 00

EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Progress cleaning.
6. Starting and adjusting.
7. Protection of installed construction.

B. Related Requirements:

1. Section 01 10 00, "Summary," for limits on use of Project site.
2. Section 01 33 00, "Submittal Procedures," for submitting surveys.
3. Section 01 77 00, "Closeout Procedures," for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
4. Section 07 84 13, "Penetration Firestopping," for patching penetrations in fire-rated construction.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 INFORMATIONAL SUBMITTALS

A. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:

1. Extent: Describe reason for and extent of each occurrence of cutting and patching.

2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
3. Products: List products to be used for patching and firms or entities that will perform patching work.
4. Dates: Indicate when cutting and patching will be performed.

    a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

B. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

C. Certified Surveys: Submit two copies signed by land surveyor.

D. Final Property Survey: Submit 10 copies showing the Work performed and record survey data.

1.5 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection

2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:

    a. Primary operational systems and equipment.
    b. Fire separation assemblies.
    c. Fire-suppression systems.
    d. Mechanical systems piping and ducts.
    e. Control systems.
    f. Communication systems.
    g. Fire-detection and -alarm systems.
    h. Electrical wiring systems.

3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:

    a. Water, moisture, or vapor barriers.
    b. Membranes and flashings.

c. Piping, ductwork, vessels, and equipment.

4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

1. Description of the Work.
2. List of detrimental conditions, including substrates.
3. List of unacceptable installation tolerances.
4. Recommended corrections.

D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish limits on use of Project site.
3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
4. Inform installers of lines and levels to which they must comply.
5. Check the location, level and plumb, of every major element as the Work progresses.
6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

A. Identification: Owner will identify existing benchmarks, control points, and property corners.

B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

E. Final Property Survey: Engage a land surveyor to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.

1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
2. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
4. Maintain minimum headroom clearance of 96 inches (2440 mm) in occupied spaces and 90 inches in unoccupied spaces.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Existing Utility Services: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to adjacent occupied areas.

F. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
5. Proceed with patching after construction operations requiring cutting are complete.

G. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.

    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.

3. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
4. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure. Openings in the building envelope separating conditioned spaces and unconditioned spaces needed to accommodate gas, plumbing and electrical lines must be sealed in compliance with the California Energy Efficiency Code.

H. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

    a. Use containers intended for holding waste materials of type to be stored.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 017419 "Construction Waste Management and Disposal."

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.8 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

3.9 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

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SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Recycling nonhazardous demolition and construction waste.
2. Disposing of nonhazardous demolition and construction waste.

1.3 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 PERFORMANCE REQUIREMENTS

A. General: Achieve end-of-Project rates for salvage/recycling of 75 percent by weight of total non-hazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials, including the following:

1. Demolition Waste:

a. Asphalt paving.
b. Concrete.
c. Concrete reinforcing steel.
d. Concrete masonry units.
e. Wood studs.
f. Wood joists.
g. Plywood and oriented strand board.
h. Wood paneling.
i. Wood trim.
j. Structural and miscellaneous steel.
k. Rough hardware.
l. Roofing.
m. Insulation.
n. Doors and frames.
o. Door hardware.
p. Windows.
q. Glazing.
r. Gypsum board.
s. Carpet.
t. Carpet pad.
u. Equipment.
v. Cabinets.
w. Plumbing fixtures.
x. Piping.
y. Supports and hangers.
z. Valves.
aa. Sprinklers.
bb. Mechanical equipment.
cc. Refrigerants.
dd. Electrical conduit.
ee. Copper wiring.
ff. Lighting fixtures.
gg. Lamps.
hh. Ballasts.
ii. Electrical devices.
jj. Switchgear and panel boards.
kk. Transformers.

2. Construction Waste:

a. Masonry and CMU.
b. Lumber.
c. Wood sheet materials.
d. Wood trim.
e. Metals.
f. Roofing.
g. Insulation.
h. Carpet and pad.
i. Gypsum board.
j. Piping.
k. Electrical conduit.
l. Packaging: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:

1) Paper.
2) Cardboard.
3) Boxes.
4) Plastic sheet and film.
5) Polystyrene packaging.
6) Wood crates.
7) Plastic pails.

1.5 ACTION SUBMITTALS

A. Waste Management Plan: Submit plan within 30 days of date established for commencement of the Work.

1.6 INFORMATIONAL SUBMITTALS

A. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work. Provide separate calculations for each category.

B. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

C. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

D. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

E. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

F. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.7 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Waste Management Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:

1. Review and discuss waste management plan including responsibilities of waste management coordinator.

2. Review requirements for documenting quantities of each type of waste and its disposition.
3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
5. Review waste management requirements for each trade.

1.8 WASTE MANAGEMENT PLAN

A. General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Distinguish between demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of demolition site-clearing and construction waste generated by the Work. Use Forms CW-1 through CW-7. Include estimated quantities and assumptions for estimates.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

1. Comply with operation, termination, and removal requirements in Section 01 50 00, "Temporary Facilities and Controls."

B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.

C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.

1. Distribute waste management plan to everyone concerned within three days of submittal return.
2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.

2. Comply with Section 01 50 00, "Temporary Facilities and Controls," for controlling dust and dirt, environmental protection, and noise control.

3.2 SALVAGING DEMOLITION WASTE

A. Salvaged Items for Reuse in the Work: Salvage items for reuse and handle as follows:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
3. Store items in a secure area until installation.
4. Protect items from damage during transport and storage.
5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.

B. Salvaged Items for Sale and Donation: Not Permitted on Project site.

C. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.

D. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.

E. Plumbing Fixtures: Separate by type and size.

F. Lighting Fixtures: Separate lamps by type and protect from breakage.

G. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Receivers and Processors: List below is provided for information only; available recycling receivers and processors include, but are not limited to, the following:

C. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.

D. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.

E. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.

1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

    a. Inspect containers and bins for contamination and remove contaminated materials if found.

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

3.4 RECYCLING DEMOLITION WASTE

A. Asphalt Paving: Break up and transport paving to asphalt-recycling facility.

B. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.

C. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.

1. Clean and stack undamaged, whole masonry units on wood pallets.

D. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.

E. Metals: Separate metals by type.

1. Structural Steel: Stack members according to size, type of member, and length.
2. Remove and dispose of bolts, nuts, washers, and other rough hardware.

F. Asphalt Shingle Roofing: Separate organic and glass-fiber asphalt shingles and felts. Remove and dispose of nails, staples, and accessories.

G. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.

H. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location.

I. Metal Suspension System: Separate metal members including trim, and other metals from acoustical panels and tile and sort with other metals.

J. Carpet and Pad: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.

1. Store clean, dry carpet and pad in a closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.

K. Carpet Tile: Remove debris, trash, and adhesive.

1. Stack tile on pallet and store clean, dry carpet in a closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.

L. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.

M. Conduit: Reduce conduit to straight lengths and store by type and size.

3.5 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

C. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.

3.6 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Remove waste materials from Owner's property and legally dispose of them.

END OF SECTION 01 74 19

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SECTION 01 77 00

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.
5. Repair of the Work.

B. Related Requirements:

1. Section 01 73 00, "Execution," for progress cleaning of Project site.
2. Section 01 78 23, "Operation and Maintenance Data," for operation and maintenance manual requirements.
3. Section 01 78 39, "Project Record Documents," for submitting record Drawings, record Specifications, and record Product Data.

1.3 ACTION SUBMITTALS

A. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

B. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.

    a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section.

5. Submit test/adjust/balance records.
6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
6. Advise Owner of changeover in heat and other utilities.
7. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
8. Complete final cleaning requirements, including touchup painting.
9. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.7 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 01 29 00, "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:

    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of Contractor.
    e. Page number.

1.9 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.

c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
f. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
g. Sweep concrete floors broom clean in unoccupied spaces.
h. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
i. Remove labels that are not permanent.
j. Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
k. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
l. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
m. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.

    1) Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report on completion of cleaning.

n. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
o. Leave Project clean and ready for occupancy.

C. Construction Waste Disposal: Comply with waste disposal requirements in Section 01 74 19, "Construction Waste Management and Disposal."

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired.

C. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.

2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.

    a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 01 77 00

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Emergency manuals.
3. Operation manuals for systems, subsystems, and equipment.
4. Product maintenance manuals.
5. Systems and equipment maintenance manuals.

B. Related Requirements:

1. Section 01 33 00, "Submittal Procedures," for submitting copies of submittals for operation and maintenance manuals.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operations and maintenance manuals in the following format:

1. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect will return two copies.

C. Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 30 days before commencing demonstration and training. Architect will return copy with comments.

1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:

1. List of documents.
2. List of systems.
3. List of equipment.
4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Architect.
7. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
8. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, post-type binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

   a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
   b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch (215-by-280-mm) white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

   a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
   b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:

1. Type of emergency.
2. Emergency instructions.
3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

1. Fire.
2. Flood.
3. Gas leak.
4. Water leak.
5. Power failure.
6. Water outage.
7. System, subsystem, or equipment failure.
8. Chemical release or spill.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following, as applicable:

1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

2.4 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Performance and design criteria if Contractor has delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.

3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.

B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of operation and maintenance manuals.
2. Comply with requirements of newly prepared record Drawings in Section 01 78 39, "Project Record Documents."

G. Comply with Section 01 77 00, "Closeout Procedures," for schedule for submitting operation and maintenance documentation.

END OF SECTION 01 78 23

Operation and Maintenance Manual

In compliance with the California Green Building Standards Code, this Operation and Maintenance Manual shall be available at final inspection and remain with the building throughout the life-cycle of the structure.

This manual has been prepared for the building located at:

Address
City/State/Zip
Builder
Address
City/State/Zip
Phone/Internet

Electricity for this property is provided by: □ Check if solar or alternate source of electricity is used.
Service Provider
Address
City/State/Zip
Phone/Internet
Alternate Source
***Information to reduce use of electricity is included.

Water for this property is provided by: □ Check if well or alternate source of water is used.
Service Provider
Address
City/State/Zip
Phone/Internet
***Information to reduce consumption of water is included.

***NOTE: The provider of this manual is required to supply information from local utility, water and waste recovery providers on methods to further reduce resource consumption, including recycle programs and locations.**

Sewer for this property is provided by: □ Check if private sewage disposal/septic is used.
Service Provider
Address
City/State/Zip
Phone/Internet
*****Information to reduce demand on sewage system is included.

Fuel Gas for this property is provided by: □ Check if Liquid Propane tank is used.
Service Provider
Address
City/State/Zip
Phone/Internet
*****Information to reduce consumption of fuel gas is included.

***NOTE: The provider of this manual is required to supply information from local utility, water and waste recovery providers on methods to further reduce resource consumption, including recycle programs and locations.**

Garbage/Trash removal for this property is provided by:
Service Provider
Address
City/State/Zip
Phone/Internet
*Information on waste reduction is included.

Recycling for this property is provided by:
Service Provider
Address
City/State/Zip
Phone/Internet
*Information about local recycling programs and their locations is included.

***NOTE: The provider of this manual is required to supply information from local utility, water and waste recovery providers on methods to further reduce resource consumption, including recycle programs and locations.**

Public Transportation

Regional and local public transportation options, including address, phone and web addresses are provided below.

Bus line	Phone/Internet
Light Rail/Train	Phone/Internet
Car Pool/Van Pool	Phone/Internet
Ride Share or Other	

Building Department

Occupancy of this dwelling was authorized by the local enforcing agency.

Local Enforcing Agency
Address
City/State/Zip
Phone

Special Inspection Verification/Certification

Special inspection required by the CALGreen code or by the local enforcing agency shall be verified. Upon completion, a copy of inspection verification and/or certificates of completion shall be included in this manual.

- HVAC system commissioning
- HERS Verification
- Cool roof verification
- Material conservation
- Blower door testing
- Attic Insulation
- Thermal insulation
- Cement reduction
- Other third party requirements

Note: The above listed items are not all-inclusive measures that may need "Special Inspection." Check with the local enforcing agency to verify mandated special inspections and verification requirements.

Fill in any other verifications or certifications below:

Solar Incentive Programs

California Programs

Information about state renewable energy incentive programs, such as the California Solar Initiative, is available through the California Energy Commission or through Go Solar California at the websites below.

- http://www.energy.ca.gov/
- http://gosolarcalifornia.ca.gov

Other Programs

Contact your local government or public utility (provided previously in this manual) for more information regarding energy conservation tips, strategies and public/private partnerships that promote enhanced sustainability and/or save money.

Tax breaks, including rebates, credits or discounts may also be available through the local government, public utilities or the Federal Government, US Department of Energy.

The U.S. Department of Energy website: http://www.energy.gov/yourhome.htm

Water Conserving Landscape

To comply with the California Green Building Standards Code, automatic irrigation system controllers for landscaping installed at the time of final inspection must be weather- or soil moisture-based.

Irrigation Controllers

There are several types of irrigation controllers that base the irrigation schedule on evapotranspiration data. Other irrigation controllers may use a combination of historical data and real-time data feeds from on-site temperature sensors, soil moisture sensors, sunlight intensity indicators or they may use data from weather stations. Weather and/or soil moisture- based controllers represent technological advances in irrigation that enable the proper amount of water required by the landscape plants or postpone irrigation during periods of rain. Utilizing these "smart" controllers is an improvement over irrigating by an arbitrary "run time" where the amount of water needed and the amount of water applied may not be effectively matched.

Landscape Water Use Conservation Methods

There are many methods to reduce the amount of water used in a landscape and still maintain the health, appearance and function of the landscape. Following are a few examples:

- Conform to local or the California Department of Water Resources' model Water Efficient Landscape Ordinance.
- Use water-efficient landscape designs utilizing native and drought tolerant plants and minimize turf areas.
- Use mulch, soil amendments or other soil improvement methods to reduce water loss through evaporation or runoff and to improve water availability for plant use.
- Install efficient irrigation systems and follow a regular maintenance schedule. Adjust irrigation controllers as necessary to accommodate changes in seasons and plant needs.
- Schedule landscape irrigation during early or late hours.
- Stay current on new technologies, strategies or products that promote efficient water use.

Irrigation System Design

Homeowners or a design professional can develop an efficient system design meeting homeowner expectations while also reducing waste and conserving natural resources.

When planning landscaping and irrigation, the following ideas can help:

- Design irrigation systems to be consistent with hydrozones (areas of plants with similar water needs.)
- Minimize the usage of spray heads.
- Install a low consumption irrigation system such as drip or subsurface.
- Use graywater or recycled water when possible.
- Consider rainwater catchment and storage systems.
- Follow the manufacturer’s installation instructions to ensure optimum system efficiency.

Operation and Maintenance Information

This property and structure require periodic maintenance of the grounds, equipment and appliances.

Manufacturer installation, operation and maintenance instructions must be followed for all equipment and appliances.

Examples of these manuals include, but are not limited to:

- HVAC system
- Water heater
- Water saving devices and water reuse systems
- Water pump and/or well
- Water treatment system
- Kitchen appliances
- Garage door and opener
- Whole house fan
- Security alarm system
- Smoke, fire and carbon monoxide alarms
- Landscape irrigation system
- Photovoltaic electrical system
- Septic system

Included or attached to this manual are the installation and maintenance instructions provided by the manufacturer for each specific appliance and/or equipment installed.

Checklist
Proper maintenance will extend the life of a building and the systems installed therein. In addition to specific manufacturer instructions for maintenance and service, the following checklist will assist setting a typical maintenance schedule required for a building.
Weekly
Survey the property, check overall condition
Check landscape irrigation system for leaks and broken heads
Check exterior lighting for burned out bulbs
Monthly
Change return air filters
Check caulking: exterior and interior at plumbing fixtures and at floors (tub, toilet, etc.)
Check exterior drainage and swales
Check exhaust fan and damper door for correct operation
Dust off and test smoke and carbon monoxide detectors for operation
Check plumbing for leaks (bathtubs, dishwasher, sinks, lavatories, showers, laundry hook ups, water heater, toilets and any other plumbing)
Check plants and shrubs – trim to avoid contact with house
Check irrigation sprinklers and adjust as necessary – avoid water spray on building and ensure uniform coverage
Test ground fault circuit interrupter (GFCI) outlets
Semi-Annually
Check clothes dryer vent pipe and remove any lint
Clean out roof gutters and downspouts
Inspect roof system for broken or missing roofing material
Check and clean window weep holes
Check weather stripping
Check outdoor AC condenser unit for obstructions and/or debris, clean unit per manufacturer's recommendation for optimal performance
Check house for evidence of termites and other pests
Check all painted surfaces
Drain water heater to remove sediment
Annually
Change batteries in smoke detectors and carbon monoxide devices
Check condensate drain lines for blockage
Trim trees to avoid contact with house and obstruction of solar panels
Check chimney flue and vents for obstructions and debris

Portions of this Property will Require Routine Maintenance for which There May Not Be a Specific Manual

Grading
The grading around the building is sloped away from the structure, which is not only functional, but a building code requirement enforced during the final inspection. The yard drainage must not drain onto neighboring property or near the building foundation. It is important the owner or tenant maintain this grade or swale to protect the building from moisture. An inspection after any landscaping, construction or a storm is necessary so the swale or grade always directs the flow of water away from the foundation of the building and to storm sewer systems or other appropriate locations approved for the structure.

Gutters
The gutter and downspouts will need periodic maintenance to ensure proper function. The required interval for this maintenance will vary by season; however, gutters and downspouts should be inspected for debris before the rainy season. When trees and other deciduous vegetation shed leaves that drop into the gutters, this will inhibit the flow of water and possibly clog downspouts. The leaves and/or debris must be removed in order for the system to work as designed. The downspouts should direct the storm water away from the foundation at least 5 feet to avoid damage to the structure. Always keep the area clear where the storm water flows out of the downspout. If a clear area is not possible, subsurface drains may need to be installed.

Irrigation
Inspect the landscape irrigation systems weekly for leaking or broken heads.

Frost-Protected Foundation Systems
When the building utilizes a Frost-Protected Shallow Foundation, as allowed by local conditions, the monthly mean temperature of the building must be maintained at a minimum of 64°F (18°C).

Relative Humidity (RH)
RH is the percent of moisture in the air compared to the maximum amount of moisture this air can hold at the same condition. Warm air will hold more moisture than cold air. The design of the HVAC system should include controlling the moisture levels appropriate to the climate. The addition of moisture (humidification) may be required in colder climates during the winter season and removed (dehumidification) during the summer months.

Automatic, computer controlled humidifiers can control the humidity levels, providing enough moisture for a healthy comfortable dwelling and within the limits to prevent window and cold surface condensation. These levels are usually between 30 to 60 percent RH although certain health conditions may dictate benefits at either the higher or lower ranges.

Hygrometer
The hygrometer will show RH. Although the RH will not be exactly the same throughout the structure, one hygrometer is usually sufficient. It should be placed where the humidity symptoms are most obvious (e.g., in the room that you are most concerned about.)

Low Relative Humidity
Below 30 percent RH, people can be uncomfortable and can suffer from dry mucus membranes, which can lead to nosebleeds and infections. In general, low RH is only a problem during the winter months when the outside air contains very little moisture. It is this dry outside air entering through cracks and openings in the building shell that causes the inside air to become dry. The greater the amount of outside air that leaks into the building, the dryer the indoor air becomes. By air-sealing and using energy-efficient construction, uncontrolled air leakage is greatly reduced, a more controlled indoor environment is created, and RH can be maintained at acceptable levels without the use of a humidifier.

Humidifiers require maintenance to avoid becoming breeding grounds for biological contaminants. The effects of bacteria, viruses, fungi, respiratory infections, allergic rhinitis, asthma, and ozone production can be minimized by higher humidity levels. Studies have shown that wintertime operation at 68° F at 70% RH provides the same level of occupant comfort as does 72° F at 30% RH. Lower utility bills and a healthier environment are both benefits of controlled RH.

High Relative Humidity
High RH can lead to occupant discomfort, annoyances, and possibly serious health issues as they relate to bacteria, viruses, fungi, mites (dust mites and mold), allergic rhinitis, asthma, and chemical interactions with mold, dust mites, and other biological pollutants.

The air conditioning system and/or stand-alone dehumidifier are designed to remove moisture (latent load) and decrease the RH levels. Studies show that summertime operation at 78° F at 30% RH provides the same level of occupant comfort as does 74° F at 70% RH. The lower humidity level will provide increased comfort, lower utility bills and lessen the risk of health issues associated with high humidity.

Using exhaust fans in the bathrooms and kitchen can remove much of the moisture that builds up from everyday activities and help keep RH below 50%. Having a humidistat connected to an exhaust fan is required in bathrooms. This is an effective way to control RH in moisture prone areas. When using an adjustable humidistat, the setting should be adjusted according to the season: lower RH in the summer and higher RH in the winter. Another benefit to using kitchen and bathroom exhaust fans is removal of odors and pollutants. These fans can also be part of an active whole house ventilation system for the entire house and help to reduce humidity levels.

END OF SECTION 01 78 23

SECTION 01 78 34

WARRANTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Requirements for special manufacturer warranties, bonds, service and maintenance contracts, and guarantees from the Contractor in addition to that required under the Contract, as specified in the individual Sections and supplementing the requirements included in the General Conditions.

1.2 DEFINITIONS

A. Standard Product Warranties: Preprinted written warranties published by individual manufacturers for particular products and specifically endorsed by the manufacturer to the Owner.

B. Special Warranties: Written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

1.3 GENERAL REQUIREMENTS

A. Guarantees and warranties between Contractor and manufacturers and between Contractor and suppliers shall not affect guarantees between Contractor and Owner or specified warranties to be provided by manufacturer to Owner.

B. Contractor shall not be held responsible for defects due to misuse, negligence, willful damage, improper maintenance, or accident caused by others nor shall it be responsible for defective parts whose replacement is necessitated by failure of Owner's maintenance forces properly to clean and service them, provided that Contractor has furnished complete operating and maintenance instructions to Owner.

C. Warranties are in addition to and not a limitation of all other rights the Owner may have against the Contractor under the Contract Documents.

D. Unless otherwise specified, by terms of a warranty or guarantee, Contractor shall agree to have removed and replaced other work, as required, that has been connected to or superimposed on substrate material to be replaced.

E. In addition to other requirements specified:

1. Compile specified service and maintenance contracts.
2. Coexecute submittals when so specified.
3. Review submittals to verify compliance with Contract Documents.
4. Submit to Architect for review and transmittal to Owner.

F. In case of items remaining uncompleted after date of Substantial Completion, the warranty or guarantee period shall run from the date of acceptance of such items.

G. If repairs or changes are required in connection with the warranted or guaranteed work within any guarantee or warranty period, the Contractor shall, promptly upon receipt of notice from the Owner or Architect and without expense to the Owner, comply with the following:

1. Place in satisfactory condition, in every particular, all of such warranted work, and correct all defects therein.
2. Make good damage to the Building or site that is the result of the cause for said repairs and changes.
3. Make good any work, including the equipment and contents of said buildings or site, disturbed in fulfilling any such warranty.

H. The Owner may, at its sole discretion, after the Contractor has received 7 days' written notice, repair or cause to be repaired special equipment that it has caused to be furnished and installed and that may be damaged and the repair of which is included in the provision of any warranty or guarantee.

1. However, where special equipment is involved that, because of its inherent nature, may suffer further damage or cause loss to the Owner owing to the 7-day delay, the Owner may, after notice, cause such equipment to be repaired.
2. The cost of such repairs shall be recoverable from the Contractor to the amount of the cost to the Owner for the completion of such repairs and the reconditioning of the equipment to its exact state prior to damage.

I. If repairs or changes are required in connection with warranted or guaranteed work within any warranty or guarantee period and notice thereof is given within such period, the warranty or guarantee shall continue as to work requiring repair or change until the things herein required to be done are completed, and the termination of the warranty period shall not apply thereto.

J. In case of work performed by subcontractors and where special warranties or guarantees are required, warranties or guarantees addressed to and in favor of the Owner shall be secured from said subcontractors.

K. No provision in the Contract Documents or in any special or general warranty or guarantee shall be held to limit, as to time or scope of liability, the Contractor's liability for defects or the liability of its sureties to less than the legal limit of liability under laws having jurisdiction.

L. The delivery of warranties and guarantees shall not relieve the Contractor from any obligation assumed under any other provision of the Contract Documents.

M. The obligation of the Contractor under this Section shall survive the termination of the Contract.

1.4 SUBMITTAL REQUIREMENTS

A. Assemble warranties, bonds, service and maintenance contracts, and extended guarantees.

B. Format:

1. Size: 8-1/2 inch x 11 inch sheets, punched for three-ring binder. Fold larger sheets to fit into binders.
2. Binders: Commercial quality, three-ring, "View" type, with durable and cleanable plastic covers.

3. Cover: Identify each packet with its contents and list the title of Project and name of Contractor.

C. Number of Original Signed Copies Required: Two each.

D. Contents:

1. Neatly typed, in orderly sequence.
2. Provide complete information for each item including:

a. Product or work item.
b. Firm name with name of principal, address, and telephone number.
c. Beginning date and duration of guarantee, warranty, bond, or service and maintenance contract.

3. Provide the following information for Owner's personnel:

a. Proper procedure in case of failure.
b. Circumstances that might affect the validity of warranty or bond.

4. Contractor's name, name of responsible principal, address, and telephone number.

1.5 TIME OF SUBMITTALS

A. Submit manufacturer warranties and Contractor’s extended guarantees within 30 days after date of Substantial Completion and prior to final request for payment.

B. For items of work, where acceptance is delayed materially beyond the date of Substantial Completion, provide updated submittal within 30 days after acceptance listing the date of acceptance as the start of the warranty period.

1.6 GUARANTEE PERIOD INSPECTIONS

A. Contractor and all subcontractors performing the construction work are required to guarantee workmanship and materials for a period of one year, or more if required by the Contractor’s Agreement with the Owner, from date of Substantial Completion.

B. Within a month of the end of such one year or longer guarantee period, Contractor's agent shall prepare an inspection report indicating the condition of the Owner's facility and related common facility, itemizing the work to be completed, performed and/or corrected.

C. Such one year period shall be continued in effect and extended until such time as Owner submits to Contractor written confirmation of the satisfactory completion of the itemized work, which confirmation shall be submitted within a reasonable period of time.

END OF SECTION 01 78 34

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SECTION 01 78 39

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Product Data.
3. Miscellaneous Records.

B. Related Requirements:
1. Section 01 73 00, "Execution," for final property survey.
2. Section 01 77 00, "Closeout Procedures," for general closeout procedures.
3. Section 01 78 23, "Operation and Maintenance Data," for operation and maintenance manual requirements.

1.3 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit two set(s) of marked-up record prints.

B. Record Product Data: Submit one paper copy of each submittal.

1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

    a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    b. Accurately record information in an acceptable drawing technique.
    c. Record data as soon as possible after obtaining it.
    d. Record and check the markup before enclosing concealed installations.
    e. Cross-reference record prints to corresponding archive photographic documentation.

2. Content: Types of items requiring marking include, but are not limited to, the following:

    a. Dimensional changes to Drawings.
    b. Revisions to details shown on Drawings.
    c. Depths of foundations below first floor.
    d. Locations and depths of underground utilities.
    e. Revisions to routing of piping and conduits.
    f. Revisions to electrical circuitry.
    g. Actual equipment locations.
    h. Duct size and routing.
    i. Locations of concealed internal utilities.
    j. Changes made by Change Order or Construction Change Directive.
    k. Changes made following Architect's written orders.
    l. Details not on the original Contract Drawings.
    m. Field records for variable and concealed conditions.
    n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

2.2 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders and record Drawings where applicable.

B. Format: Submit record Product Data as paper copy.

1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

2.3 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Format: Submit miscellaneous record submittals as paper copy.

1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION 01 78 39

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SECTION 01 79 00

DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Training in operation and maintenance of systems, subsystems, and equipment.
3. Demonstration and training video recordings.

B. Unit Price for Instruction Time: Length of instruction time will be measured by actual time spent performing demonstration and training in required location. No payment will be made for time spent assembling educational materials, setting up, or cleaning up.

1.3 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 01 40 00, "Quality Requirements," experienced in operation and maintenance procedures and training.

1.4 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

1. Operations: Include the following, as applicable:

a. Startup procedures.
b. Equipment or system break-in procedures.
c. Routine and normal operating instructions.
d. Regulation and control procedures.
e. Control sequences.
f. Safety procedures.
g. Instructions on stopping.
h. Normal shutdown instructions.
i. Operating procedures for emergencies.
j. Operating procedures for system, subsystem, or equipment failure.
k. Seasonal and weekend operating instructions.
l. Required sequences for electric or electronic systems.
m. Special operating instructions and procedures.

2. Adjustments: Include the following:

a. Alignments.
b. Checking adjustments.
c. Noise and vibration adjustments.
d. Economy and efficiency adjustments.

3. Troubleshooting: Include the following:

a. Diagnostic instructions.
b. Test and inspection procedures.

4. Maintenance: Include the following:

a. Inspection procedures.
b. Types of cleaning agents to be used and methods of cleaning.
c. List of cleaning agents and methods of cleaning detrimental to product.
d. Procedures for routine cleaning
e. Procedures for preventive maintenance.
f. Procedures for routine maintenance.
g. Instruction on use of special tools.

5. Repairs: Include the following:

a. Diagnosis instructions.
b. Repair instructions.
c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
d. Instructions for identifying parts and components.
e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 01 78 23, "Operation and Maintenance Data."

B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
   1. Owner will furnish Contractor with names and positions of participants.

C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

   1. Schedule training with Owner through Construction Manager, with at least seven (7) days' advance notice.

D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

END OF SECTION 01 79 00

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SECTION 03 10 00

CONCRETE FORMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes

1. Concrete formwork, shoring, bracing, and anchorage.
2. Concrete formwork accessories.

B. Related Requirements:

1. Section 03 20 00, “Concrete Reinforcing.”
2. Section 03 30 00, “Cast-in-Place Concrete.”

1.3 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

1.4 DESIGN REQUIREMENTS

A. Design, engineer, and construct concrete formwork, shoring, and bracing in accordance with design and code requirements, resulting in concrete conforming to required shape, line, and dimension.

1.5 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of these Specifications.

C. Referenced Standards:

1. California Building Code (2022)
2. ACI 117 – Specifications for Tolerances for Concrete Construction and Materials.
3. ACI 301 – Specifications for Structural Concrete for Buildings.
4. ACI 318 – Building Code Requirements for Structural Concrete.
5. ACI 347 – Guide to Formwork for Concrete.
6. AHA A135.4 – Basic Hardboard.
7. PS 1 – Construction and Industrial Plywood.
8. WCLIB Rule 17 – Standard Grading Rules for West Coast Lumber.

1.6 SUBMITTALS

A. General: Submit as noted below and per 01 33 00, “Submittal Procedures.”

1.7 QUALITY ASSURANCE

A. Regulatory Requirements: Conform to CBC for design, fabrication, erection, and removal of forms.

B. Field Samples: Provide only as requested by Architect.

C. Coordinate work in this section with work in related sections and with the work of other trades.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

A. Architectural Cast Concrete Finish:

1. Per architect: Plywood, 5/8 inch minimum thickness, conforming to APA Plyform, sound undamaged sheets with clean, true edges with joints taped or steel concrete forms or other approved material.
2. Cylindrical Forms: Per architect; Sonotube or other approved material.

B. Smooth Concrete Concealed from View: Plywood, 5/8 inch minimum thickness, conforming to APA B-B Plyform or better or steel concrete forms or other approved material.

C. Concrete Concealed from View:

1. 2x lumber; plywood, 5/8 inch minimum thickness conforming to APA Plyform; tempered concrete form hardboard conforming to AHA A135.4; steel concrete forms or other approved material.
2. Cylindrical Forms: Sonotube or other approved material.

2.2 ACCESSORIES

A. Form Ties:

1. Concrete Exposed to View: Galvanized metal snap ties with cone washers with 1 inch break back dimension, free of defects that could leave holes larger than 1 inch diameter in concrete surface. Verify with architect if there are special spacing requirements.
2. Concrete Concealed from View: Galvanized metal snap ties or wedge form ties.

B. Nails, Spikes, Lag Bolts, Through Bolts: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete. Not to be embedded in concrete.

C. Chamfer Strips: Wood, metal, or rubber strips; location and size as shown on drawings.

D. Expansion Joint Filler: Preformed, resilient, flexible, and non-extruding conforming to ASTM D1751.

E. Keyed Construction Joint: Minimum 24 gage galvanized steel; shaped with formed key (minimum 1-1/2 inch) for load transfer; and with knockouts for dowel placement. Acceptable products: G-33 Screed Key Joint manufactured by Dayton/Richmond Concrete Accessories (721 Richard St., Miamisburg, OH 45342; toll free: 800.745.3700; phone: 937.866.0711; fax: 937.866.8027; URL: http://www.daytonrichmond.com), or approved equal.

F. Spreaders: Metal (wood not permitted).

G. Form Release Agent: Commercially formulated form release agents that will not bond with, stain or adversely affect concrete surface, and will not impair subsequent treatment of concrete surfaces, nor impede the wetting of surfaces to be cured with water or curing compounds. Coating containing mineral oils or other non drying ingredients will not be permitted. Apply coating in conformity with manufacturer's specifications before reinforcing steel is placed. "Nox Crete Form Coating" as manufactured by The Nox Crete Company, "Arcal 80" as manufactured by Arcal Chemical Corporation, "Synthex" as manufactured by Industrial Synthetics Company or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine job site conditions and verify field dimensions.

B. Report unacceptable conditions. Begin installation only when unacceptable conditions have been corrected.

3.2 EARTH FORMS

A. Concrete may be placed against neatly cut earth where feasible, conforming to the following criteria:

1. Earth form trenches must be able to stand without caving in.
2. Sluffage not permitted. Remove loose soil and all debris prior to placing concrete.
3. Remove all standing water prior to placing concrete.

3.3 FORM CONSTRUCTION

A. Erect formwork, shoring, and bracing in accordance with ACI 301.

B. Construct formwork to maintain tolerances required by ACI 347.

C. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.

D. Arrange and assemble formwork to permit ease of dismantling and stripping and prevent damage to concrete during stripping.

E. Align joints and make watertight. Keep form joints to a minimum.

F. Metal stakes in contact with reinforcing steel and all wood stakes that are used to support formwork or reinforcement are not permitted to occur within the finished concrete section.

G. Protect underslab vapor barrier/retarder from damage at all times.

H. Concrete work out of alignment, level or plumb will be cause for rejection of the whole work affected and, if so rejected, such work shall be removed and replaced as directed, with no additional cost to the Owner.

I. When a concrete pour has been stopped for a sufficient length of time so that shrinkage or warp has separated the forms and the concrete, provide for form adjustment to draw the forms into firm contact with concrete before placing additional concrete. Take precautions to prevent any shoulder or ledge from being formed at a cold joint.

3.4 FORM RELEASE AGENT APPLICATION

A. Apply form release agent on formwork in accordance with manufacturer's recommendations.

B. Apply prior to placement of reinforcing steel, anchoring devices and embedded items.

3.5 INSERTS, EMBEDDED PARTS AND OPENINGS

A. Locate and set in place items which will be cast directly into concrete.

B. Ensure items are not disturbed during concrete placement.

C. Obtain approval from Architect/Engineer before framing openings not specifically indicated on Drawings.

3.6 FORMWORK CLEANING AND INSPECTION

A. Inspect erected formwork, shoring and bracing to ensure that work is in accordance with formwork design and that supports, fastenings, wedges, ties and embedded items are secure to prevent displacement and distortions.

B. Clean forms and adjacent surfaces as formwork is erected and prior to concrete placement. Remove wood chips, sawdust, dirt, and other debris. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris are drained and removed.

C. In the case where a Structural Observation is required or requested notify the Engineer at least 48 hours in advance of the beginning of pouring operations and at the completion of formwork construction. An observation will be made of the forms for approval of finished work and general layout only. The observation shall in no way relieve the Contractor of responsibility for the design and safety of formwork, shoring, and bracing.

3.7 FORM REMOVAL

A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.

B. Concrete must be allowed to cure long enough to avoid damage during form removal.

C. Remove forms progressively and in accordance with ACI 318, Section 26.11.

D. As a minimum, formwork and shoring shall remain in place for the following periods:

1. Concrete on Grade: Minimum 24 hours.
2. Concrete Not Supporting Weight of Concrete (formwork for sides of beams, walls, columns): Minimum 48 hours.
3. Concrete Supporting Weight of Concrete (formwork for beam soffits, joists, structural slabs): 100% of 28-day compressive strength has been achieved. Compressive strength of concrete is to be determined by testing field or laboratory–cured test specimens.

3.8 FORM REUSE

A. Forms in good condition may be reused.

B. Clean and inspect forms prior to reuse. Do not reuse split, warped, delaminated, or otherwise damage forms that will impair surface condition and quality of cast concrete exposed to view.

3.9 CLEAN-UP

A. Upon completion of the work of this section, remove all surplus materials, rubbish and debris from the premises.

END OF SECTION 03 10 00

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SECTION 03 20 00

CONCRETE REINFORCING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes

1. Concrete steel reinforcement and accessories.

B. Related Requirements:

1. Section 03 10 00, “Concrete Forming.”
2. Section 03 30 00, “Cast-in-Place Concrete.”
3. Section 04 22 00, “Concrete Unit Masonry.”

1.3 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

1.4 DESIGN REQUIREMENTS

A. Design, engineer, furnish, and install concrete reinforcing and accessories in accordance with design and code requirements.

1.5 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of these Specifications.

C. Referenced Standards:

1. California Building Code (current edition).
2. ACI 301 – Specifications for Structural Concrete for Buildings.
3. ACI 315 – Details and Detailing of Concrete Reinforcing.
4. ACI 318 – Building Code Requirements for Structural Concrete.
5. ASTM A82 – Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
6. ASTM A185– Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
7. ASTM A497– Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.
8. ASTM A615– Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
9. ASTM A706– Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
10. ASTM A1055 – Standard Specification for Zinc and Epoxy Dual-Coated Steel Reinforcing Bars
11. CRSI Manual of Standard Practice
12. AWS D1.4 – Structural Welding code – Reinforcing Steel.

1.6 SUBMITTALS

A. General: Submit as noted below and per 01 33 00, “Submittal Procedures.”

B. Shop Drawings (as required per Structural):

1. Prepare in accordance with ACI 315.
2. Indicate bar sizes, spacings, locations, splicing, laps and quantities of steel reinforcement and wire fabric, bending and cutting schedules, and supporting and spacing devices.
3. Identify shop drawings with reference to sheet and detail numbers from the Contract Documents.
4. Do not use scaled dimensions from drawings to determine lengths of steel reinforcement.
5. One of the submittal copies shall be reproducible.
6. Contractor has responsibility for correctness and completeness of steel reinforcing requirements.
7. Begin fabrication only when shop drawings have been approved.

C. Product Data: Submit manufacturer’s descriptive literature, installation instructions, and product specification for the following products:

1. Mechanical splicing devices.
2. Bar supports.

D. Samples: As noted below.

E. Control Submittals:

1. Submit certified copies of mill test reports of reinforcing materials analysis to Owner’s testing agency.

1.7 QUALITY ASSURANCE

A. Perform work in accordance with CRSI Manual of Standard Practice, ACI 301, and CBC Chapter 19 as follows:

1. Steel reinforcement: CBC Section 1903.5
2. Details of reinforcement: CBC Section 1907.

B. Manufacturers and Installers shall be companies or individuals who are regularly engaged in this business.

C. Welding procedures, welding operators and welders shall be qualified in accordance with AWS D1.4.

D. Structural Tests and Inspections: As required per Structural, CBC Chapter 17, and Building Jurisdiction.

E. Coordinate work in this section with work in related sections and with the work of other trades.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver steel reinforcement in bundles marked with identification tags.

B. Handle and store materials to prevent damage and contamination, excessive rusting or coating with grease, oil, or other objectionable materials.

C. Store steel reinforcement, fabricated assemblies, and accessories off the ground on platforms, skids, or other supports.

D. Deliver and store welding electrodes in accordance with AWS D1.4.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

A. Reinforcing Steel: ASTM A615, Grade 40 for #4 bars and smaller, Grade 60 for #5 bars and larger, deformed billet steel bars.

B. Reinforcing Steel (weldable): ASTM A706, Grade 60, low-alloy deformed steel bars.

1. Where specified on the plans, reinforcing steel shall also conform to ASTM A1055 for zinc and epoxy dual-coated reinforcing.

C. Dowel Bars: Same grade as bars to which dowels are connected.

1. Where specified on the plans, dowels shall also conform to ASTM A1055 for zinc and epoxy dual-coated reinforcing.

D. Plain Steel Wire (may be used for spiral reinforcement): ASTM A82.

E. Welded Wire Fabric: ASTM A185, 65 ksi minimum yield strength, fabricated from as-drawn steel wire into flat sheets (rolled fabric not permitted). Size: Per Structural drawings.

F. Tie Wire: FS QQ-W-461 (ASTM A497), annealed steel wire, 16 gage minimum.

2.2 ACCESSORIES

A. Bar Supports (Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place): Provide in accordance with CRSI Manual of Standard Practice from steel wire, plastic, or precast concrete or fiber-reinforced concrete of equal to or greater compressive strength than surrounding concrete. Provide as follows:

1. Footings: Precast concrete blocks with tie wires.
2. Slab on grade: Precast concrete blocks, plastic coated steel fabricated with bearing plates, or specifically designed wire-fabric supports fabricated of plastic.
3. Where legs of wire bar supports contact forms: CRSI Class 1 plastic-protected or CRSI Class 2 stainless steel bar supports.
4. Where support is no closer to concrete surface than 1/2 inch: CRSI Class 3 wire supports.
5. Supports placed against ground: Precast concrete blocks not less than 4 inch square with embedded wire.

B. Welding Materials:

1. Welding electrode: AWS D1.4, low hydrogen, E70XX series.

C. Mechanical Splices: Splicing devices capable of developing 125 percent of the specified yield strength of the bar in compression and tension. Acceptable mechanical splices:

1. Metal sleeve with cast filler metal, mechanical threaded connections using a metal coupling sleeve with internal threads, or approved equal. Mechanical splices shall have an ICBO report and manufacturer’s literature submitted to the Engineer for approval prior to use of mechanical splice.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine job site conditions and verify field dimensions.

B. Report unacceptable conditions. Begin installation only when unacceptable conditions have been corrected.

3.2 STEEL REINFORCEMENT FABRICATION

A. Fabricate to shapes and dimensions in accordance with approved shop drawings conforming to CRSI Manual of Standard Practice, ACI 315, ACI 318, and CBC Chapter 19 as follows:

1. Standard Hooks: CBC Section 1907.1.
2. Minimum Bend Diameters: CBC Section 1907.2.

3. Bending: CBC Section 1907.3. Cold bend steel reinforcement in the field or at the mill. Heating for bending is not permitted unless otherwise specifically allowed.

B. Spirals: Provide 1-1/2 finishing turns at top and bottom with minimum 135 degree hook at each end. Lap splice at 48 bar diameters minimum with 135 degree hooks into the confined core at ends.

C. Weld steel reinforcement in accordance with AWS D1.4.

D. Clean steel reinforcement of rust and mill scale, earth, moisture, and other foreign materials before fabrication or placement and prior to placement of concrete.

E. Fabricate reinforcement in accordance with the requirements of ACI 315 where specific details are not shown or where Drawings and Specifications are not more demanding.

3.3 REINFORCEMENT PLACEMENT

A. Place steel reinforcement in accordance with approved shop drawings conforming to CRSI Manual of Standard Practice.

B. All reinforcement shall be accurately set in place, lapped, spliced, spaced rigidly and securely held in place and tied with wire at all splices and crossing points with the wire ties pointed away from the form.

C. Install steel reinforcement in largest practical lengths.

D. Concrete Cover: Refer to Structural Drawings.

E. Laps: Refer to Structural Drawings.

1. Offset laps in adjacent bars.
2. Tie securely to prevent displacement during concrete placement.

F. Splices (other than lap splices):

1. Install mechanical splice in accordance with manufacturer’s written instructions.

G. Welding:

1. Welding is not permitted unless specifically detailed on drawings or approved by Architect.
2. Employ shielding metal-arc method. Comply with AWS D1.4.
3. Welding is not permitted on bars where the carbon content is not known or is determined to exceed 0.75%.
4. Welding is not permitted within 2 bar diameters of any bent portion of a bar which has been bent cold.
5. Welding of crossing bars is not permitted.

H. Maintain minimum clear distance between parallel bars at not less than 1-1/2 times nominal bar diameter, 1-1/2 times maximum size of coarse aggregate, or 1-1/2 inch.

I. Dowels at Doweled Joints: Place where indicated on the drawings. Grease loose end to prevent concrete from bonding to dowel. Sleeves may be used when approved.

J. Welded Wire Fabric: Install in longest practical lengths on bar supports to minimize sagging. Lap edges and ends of adjoining sheets at least 24 inches. Offset laps to avoid continuous laps in either direction. Tie lap joints at 12 inches on center.

K. Field Adjustments: Move steel reinforcement as necessary to avoid interference with other reinforcing steel, conduits or other embedded items within approved tolerances.

1. Do not cut bars to clear sleeves or slots through slabs or walls. Bend bars around these openings.
2. Compensate for steel reinforcement terminated at openings in slabs by placing one half of steel reinforcement terminated on each side of openings for the full length of opening plus two times the lap splice length, center on opening.
3. Steel reinforcement moved to avoid interference with other reinforcements, conduits, or embedded items, including additional steel reinforcement to meet structural requirements are subject to inspection and approval before concrete placement.

3.4 REINFORCEMENT INSPECTION

A. Testing Service: Owner will select and pay for independent testing agency, which will perform the following:

1. Inspect shop and field welding per AWS D1.4, including checking materials, equipment, procedures, and welder qualifications.
2. Inspector shall employ non-destructive testing or any other aid to visual inspection deemed necessary to assure adequacy of weld.
3. Additional requirements for testing and inspection: Refer to Structural Drawings

B. Placement of steel reinforcement shall be inspected where noted on the Structural Drawings.

3.5 PROTECTION

A. Protect steel reinforcement from damage and displacement.

B. Protect for potential rust staining of adjacent surfaces. Wrap steel reinforcement with impervious tape or other methods as approved. Remove protective cover and clean reinforcement before concrete placement.

C. Install safety caps on all exposed ends of vertical steel reinforcement that pose a danger to life safety.

END OF SECTION 03 20 00

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes

1. Cast-in-place concrete.
2. Concrete admixtures.
3. Curing and surface slab treatment.
4. Grouting, bonding, and patching materials.
5. Accessories:

    a. Underslab vapor barrier/retarder.
    b. Sodium bentonite and butyl rubber engineered swell hydrophilic waterstop strip. Described as system **BG-1** in the Waterproofing Schedule.

B. Related Requirements:

1. Section 03 10 00, “Concrete Forming.”
2. Section 03 20 00, “Concrete Reinforcing.”
3. Section 04 22 00, “Concrete Unit Masonry.”
4. Section 07 26 16, “Under-Slab Vapor Barrier."

1.3 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

1.4 DESIGN REQUIREMENTS

A. Furnish, place, and finish cast-in-place concrete and accessories in accordance with design and code requirements.

1.5 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of these Specifications.

C. Referenced Standards:

1. California Building Code (2022)
2. ACI 117 – Standard Tolerances for Concrete Construction and Materials.
3. ACI 301 – Specifications for Structural Concrete.
4. ACI 302 – Guide for Concrete Floor and Slab Construction.
5. ACI 305R – Hot Weather Concreting.
6. ACI 306 – Standard Specification for Cold Weather Concreting.
7. ACI 318 – Building Code Requirements for Structural Concrete.
8. ACI 360R – Design of Slabs on Ground.
9. ASTM C31 – Standard Practice for Making and Curing Concrete Test Specimens in the Field.
10. ASTM C33-03 – Standard Specifications for Concrete Aggregates.
11. ASTM C39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
12. ASTM C94 – Standard Specification for Ready-Mixed Concrete.
13. ASTM C143 – Standard Test Method for Slump of Hydraulic Cement Concrete.
14. ASTM C150 – Standard Specification for Portland Cement.
15. ASTM C172 – Standard Practice for Sampling Freshly Mixed Concrete.
16. ASTM C192 – Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory.
17. ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete.
18. ASTM C330 – Standard Specification for Lightweight Aggregates for Structural Concrete.
19. ASTM C494 – Standard Specification for Chemical Admixtures for Concrete.
20. ASTM C618 – Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
21. ASTM C881 – Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
22. ASTM C928 – Standard Specification for Packaged, Dry, Rapid-Hardening Cementitious Materials for Concrete Repairs.
23. ASTM C1077 – Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.
24. ASTM C1107 – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
25. ASTM C1059 – Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete.
26. ASTM E1745-97 – Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

1.6 SUBMITTALS

A. General: Submit as noted below and per 01 33 00, “Submittal Procedures.”

B. Concrete Mix Designs: As required per Structural.

C. Product Data: Submit manufacturer's descriptive literature and product specification for each product. Include manufacturer's written instructions and installation procedures.

D. Samples: Submit product samples when requested by Architect or testing laboratory.

E. Control Submittals (when requested):

1. Certificates:

a. Manufacturer's certification that materials (cementitious materials, aggregates, and admixtures) conform to specifications.

2. Test Reports.
3. Batch Ticket: Furnish accepted batch tickets at the time of delivery for each concrete load. Indicate on each ticket equipment used for measuring and quantities, by weight, of cement, sand, each class of aggregate, admixtures, and amount of water in the aggregate, water added at the batching plant, and any water withheld at the batch plant. In addition, include mix number, total yield in cubic yards, date and time of day (dispatch time, plant departure time, site arrival time, unloading start and end time).
4. Concrete Placement Record: Keep a record on site including time and date of concrete placing for portions of the structure for the duration of the project. Record additional information not included in batch ticket such as admixtures added at the job site. Make records available for inspection.

1.7 QUALITY ASSURANCE

A. Qualifications:

1. Concrete Supplier: Firm specializing in products specified in this section.
2. Concrete Batch Plant: Certified per NRMCA Plant Certification Checklist.
3. Independent Testing Laboratory: Acceptable to the Engineer.

B. Structural Tests and Inspections: As required per Structural, CBC Chapter 17, and Building Jurisdiction.

C. Coordinate work in this section with work in other sections and with the work of other trades.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in manufacturer's original containers, dry and undamaged, with seals and labels intact.

B. Store cement and other cementitious materials in weathertight buildings, bins, or silos which exclude moisture and contaminants and keep building materials completely separated.

C. Arrange and use aggregate stockpiles in a manner to avoid excessive segregation and to prevent contamination with other materials or with other sizes of aggregates. Do not store aggregates directly on ground unless a sacrificial layer is left undisturbed.

D. Do not use admixtures which have been in storage at the project site for longer than 6 months or which has been subjected to freezing unless these are retested and proven to meet the specified requirements.

E. Clearly and accurately label materials after containers have been opened.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

A. Cementitious Materials:

1. Cement: ASTM C150, Type as required per Structural, low alkali.
2. Supplementary Cementitious Materials:

    a. Fly Ash: ASTM C618.

B. Aggregates:

1. Fine and coarse aggregates: ASTM C33. Uniformly graded per Structural Drawings.
2. Maximum nominal size of coarse aggregate: CBC Section 1903.3.2 and as follows:

    a. 1 inch.

C. Water: Per CBC Section 1903.4, potable and complying with ASTM C94/C94M.

D. Admixtures:

1. General:

    a. Manufacturer certified to contain no more than 0.1 percent water-soluble chloride ions by mass of cementitious material. Admixtures containing calcium chloride or thiocyanates not allowed.
    b. Compatible with other admixtures and cementitious materials in the concrete mix.
    c. Obtain Engineer’s written approval prior to use of admixtures.

2. Air Entraining Agents: ASTM C260.
3. Water Reducing: ASTM C494.

2.2 CURING MATERIALS AND SLAB TREATMENT

A. General:

1. Obtain Engineer’s written approval prior to use of curing materials and slab treatments.
2. Comply with regulations of the California Air Resources Board and the local Air Pollution Control/Air Quality Management District.
3. Before use of any curing compounds, Contractor shall provide written approval by subsequent trades. Approval shall indicate all products are compatible and will not be adversely affected by the use of the curing compound. Failure to do so will require the removal of affected material by the contractor at no additional cost to the Owner. This includes but is not limited to tile products, carpeting and other adhesively applied products..

2.3 GROUTING, BONDING, AND PATCHING MATERIALS

A. Grout:

1. Non-shrink Grout: ASTM C1107, Type B or C, non-metallic aggregate grout, 8000 psi minimum 28-day compressive strength.
2. Non-shrink Drypack Grout: Non-shrink, natural aggregates, 8000 psi minimum 28-day compressive strength.

B. Bonding Materials:

1. Structural Bonding Epoxy Adhesive: 2 component, 100 percent solids, 100 percent reactive; meets or exceeds ASTM C881, Type V, Grade 2, Class B or C as appropriate.

2.4 ACCESSORIES

A. Underslab Vapor Barrier/Retarder: Per Structural Drawings and as specified in this Section.

1. Properties:

a. Thickness: Minimum 15 mils in accordance with ACI 302.

2. Accessories:

a. Seam Tape: As recommended by underslab vapor barrier/retarder manufacturer.
b. Vapor Proofing Mastic: As recommended by underslab vapor barrier/retarder manufacturer.

B. Bedding Layer: Per Structural Drawings.

C. Capillary Barrier: Per Structural Drawings.

D. Expansion Joints: Per Section 03 10 00, “Concrete Forming.”

E. Anchors, Anchor Bolts, Nuts, and Washers: Per Section 05 50 00, “Metal Fabrications.”

F. Sodium bentonite and butyl rubber engineered swell hydrophilic waterstop strip.

1. Waterproofing Schedule System **BG-1**: VM Aussie Swell Red by AVM Industries, Inc.

a. Hydrophilic waterstop strip sealant: Marine-Grade moisture cure polyether Sealant / Adhesive formulated for applications above the water line or after curing below the water line and in areas where solvent based materials are not tolerated; Aussie Seal M by AVM Indisutries, Inc.

2.5 CONCRETE MIX

A. General:

1. Proportion concrete design mixes per ACI 301 Section 3.9 and CBC Section 1905.

2. Proportion concrete design mixes per CBC Section 1905.2.3 (Design mix based on laboratory tests) prepared and tested by an independent testing laboratory prior to design mix approval.
3. Proportion by field experience may be permitted, where concrete manufacturer can establish the uniformity of its production for concrete of similar type and strength based on recent test data in accordance with CBC Section 1905.2.3.
4. Proportion concrete design mix to attain compressive strength as specified per plan or as specified below and as needed, with early strength to meet Contractor's work program.

B. Mix Design:

1. As required per Structural.

C. Admixtures:

1. Use specified admixtures as accepted by Engineer. Verify compatibility of concrete admixtures when using multiple admixtures. Verify compatibility with architectural finishes and subsequent materials to be applied to finished concrete.

2.6 CONCRETE MIXING

A. Ready-Mixed Concrete: Per CBC Section 1905.8; measure, batch, mix, and deliver according to ASTM C94/C94M.

B. Job-Mixed Concrete: Per CBC Section 1905.8.

2.7 SOURCE QUALITY CONTROL

A. Owner shall employ a testing laboratory accepted by Engineer to perform the following:

1. Review mix designs and certificates of compliance for materials Contractor proposes to use.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine and verify the following prior to concrete placement.

1. Forms are erected, adequately braced, sealed, lubricated (if required), and bulkhead provided where placing is to stop.
2. Thoroughly water soak wood forms other than plywood at least 12 hours before concrete placement.
3. Steel reinforcement are accurately positioned, securely tied and braced. Verify concrete cover requirements.
4. Coordination with related work is completed.
5. Anchors and embedded items are in position, securely held and braced.
6. Construction joints and previously placed concrete are prepared as specified.
7. Compliance with cold-weather or hot-weather requirements.
8. Compliance with cleaning and preparation requirements.

B. Report unacceptable conditions to the Engineer. Begin installation only when unacceptable conditions have been corrected.

C. Concrete formwork, reinforcement, inserts, and embedded items are subject to Engineer's approval. Notify Engineer at least 48 hours prior to concrete placement.

3.2 PREPARATION

A. Underslab Vapor Barrier/Retarder: Install in accordance with manufacturer's instructions, ASTM E1643, and as specified in this Section.

1. Lay vapor barrier/retarder using the greatest widths and lengths practicable to eliminate joints wherever possible.
2. Seal all penetrations per manufacturer's instructions using mastic and seal tape. No penetration of underslab vapor barrier/retarder is permitted except for reinforcing steel and permanent utilities.
3. Replace torn, punctured or damaged underslab vapor barrier/retarder material prior to placing concrete.
4. Control concrete placement so as to prevent damage to underslab vapor barrier/retarder.

B. Cleaning: Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt and other debris before placing concrete.

C. Refer to Section 03 101 00, "Concrete Forming" for formwork preparation.

D. Refer to Section 03 20 00, "Concrete Reinforcing" for reinforcing steel preparation.

3.3 PLACING CONCRETE

A. Place concrete in accordance with ACI 301 and as specified in this Section.

B. Add no water during delivery and at the project site unless total water added at plant is less than design water to attain slump of accepted mix design. Water may be added to concrete at job site, not to exceed the design water content. If additional slump is required, use water reducing admixture.

C. Handle concrete from mixer to forms in a continuous manner.

D. Deposit concrete as close as possible to its final position in the forms, with no vertical drop greater than 4 feet except where suitable equipment is provided to prevent segregation and where specifically authorized.

E. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If concrete cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation.

F. Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid inclined construction joints. Place each layer while preceding layer is still plastic to avoid cold joints.

G. Consolidate all concrete by suitable means during placement. Concrete shall be thoroughly worked around reinforcement and embedded fixtures and into the corners of forms.

H. Concrete Floors and Slabs: Deposit and consolidate concrete for floors and slabs in a continuous operation within limits of construction joints until placement of a panel or section is complete.

1. Maintain reinforcement in position on chairs during concrete placement.
2. Screed slab surfaces with a straightedge and strike off to correct elevations.
3. Slope exterior surfaces for drainage as directed, unless otherwise shown.

I. Hot Weather Concreting: Place concrete according to ACI 305R and as follows:

1. Cool components before mixing to maintain concrete temperature below 85 degrees F at time of placement. Chilled mixing water or chopped ice may be used to control temperature. Calculate and include water equivalent of ice in designed water cement ratio.
2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Dampen forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.
4. Protect concrete from surface drying. Methods may include but are not limited to: evaporation retardant, sun shades, wind breaks, and fog misting.

J. Cold Weather Concreting: Place concrete according to ACI 306 and as follows:

1. Protect concrete work from physical damage or reduced strength as a result of frost, freezing, or low temperatures.
2. When ambient temperature is expected to fall below 40 degrees F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 degrees F.
3. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade.
4. Do not incorporate calcium chloride, salt or other materials containing antifreeze agents into the concrete mix.
5. Upon written approval and subject to prior approval of mix design, accelerating admixtures, containing no calcium chloride, as specified in this section may be used.

3.4 JOINTS

A. Construction Joints: Comply with CBC Section 1906.4. Install joints so strength and appearance of concrete is not impaired at locations indicated or as accepted by Engineer.

1. Continue reinforcement across construction joints unless otherwise indicated.
2. Expose concrete aggregates creating a rough surface. Within 24 hours after placing concrete, remove retarded surface mortar using either high pressure water jetting or stiff brushing or a combination of both to expose coarse aggregate. A rough surface of exposed aggregate may also be produced by sandblasting followed by high pressure water jetting.
3. Surface of construction joint is to be cleaned and laitance removed. Immediately before new concrete is placed, joint shall be wetted and standing water removed.
4. Where new concrete joins existing concrete (concrete more than 60 days old), clean and roughen existing concrete to expose coarse aggregate. Coat with epoxy bonding compound prior to placing new concrete.

B. Slab-on-Grade Control Joints: Tool or saw-cut weakened plane joints at a depth of at least 1/4 slab thickness where shown on drawings. Where not indicated in the drawings, provide at distances (in feet) every 2 to 3 times of slab thickness (in inches).

1. Sawed Joint: Saw cut 1/4 inch width as soon as the concrete has hardened sufficiently to prevent raveling (dislodging of the aggregates) of the edges of the saw cut and completed before shrinkage stresses become sufficient to produce cracking.
2. Fill control joint with epoxy joint filler in accordance with manufacturer's written instructions.

C. Slab-on-Grade Expansion Joints and Isolation Joints: Provide expansion joints and isolation joints where shown on the drawings, where slab abuts vertical surfaces, at curbs, gutters, and sidewalks.

1. Extend joint-filler strips full width and extend to full depth of joint, terminating not less than 1/2 inch nor more than 1 inch from finish surface.
2. Install strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

D. Dowel Joints: Install dowel sleeves and dowels or dowel bar and support assemblies at joints where shown on the drawings.

3.5 WATERSTOP INSTALLATION

A. Hydrophilic Waterstop: At typical penetrations, and cold joints install hydrophilic waterstop in accordance with installation instructions in manufacturer's published literature, including but not limited to, the following:

1. Surfaces should be clean and dry. Remove all dirt, rocks, rust, debris or other foreign matter that might inhibit the adhesive from bonding to the concrete. Do not install Aussie Swell in standing water.
2. Apply a continuous bead of Aussie Seal M along the substrate where Aussie Swell will be installed. Assure proper 3-inch concrete coverage will be maintained.
3. Mechanical fasteners should not be used to secure product alone, but may be used in conjunction with Aussie Seal M.
4. Tightly butt coil ends together to form a continuous waterstop (do not overlap coil ends). Place in maximum practical lengths to minimize coil end joints.

3.6 CONCRETE FLOORS AND SLABS FINISHING

A. Comply with ACI 302.1R. Comply with flatness and levelness tolerance requirements of this Section.

B. Floor Slab Levels: All surfaces shall finish true to 1/4" in 10 feet on a straight edge in any direction with maximum high and low variance occurring in not less than 20 feet and with 1/16" maximum tolerance in any one running foot. Particular care shall be taken to finish troweling around the edges of the slabs so finish surface at edges shall be at same elevations as the rest of the top surface of the slab. Slabs shall be laid to temporary screeds set level at the proper elevations.

C. Finishing:

1. Steel Trowel Finish: All interior slabs and exterior curbs shall receive a monolithic steel trowel finish. Surfaces shall be screeded, woodfloated, and steel troweled.
2. Broomed Finish: Broomed finish for exterior slabs, when noted on drawings, shall be finished same as steel trowled finish, except that after hand troweling, finish surfaced by scoring in parallel lines with a fine hair stable broom perpendicular to the direction of traffic or as indicated on the drawings, and as directed.
3. Exposed Aggregate: Exposed Aggregate finish for exterior slabs, where noted on drawings, shall be finished same as steel trowel finish, except that prior to steel troweling slab shall be seeded with pea gravel as noted on drawings. After finish is partially set and walkable, broom and wash to partially expose the pea gravel.
4. Special Finishes: Toned concrete, where specified on the architectural plans, shall be finished per manufacturer's specifications. Contractor shall submit one test panel 12"x12" minimum for each type of finish.
5. Addition of Materials: The addition of cement, sand, water, or mortar to slab surfaces while finishing concrete is strictly prohibited.

3.7 CURING AND PROTECTION

A. Protect freshly placed concrete from premature drying, rapid temperature change, mechanical injury, and injury from flowing water for a curing period not less than 7 days. Concrete shall be maintained above 50 degrees F and in a moist condition during this time. Comply with ACI 306 for cold-weather protection and ACI 305R for hot-weather protection during curing.

B. Contact Engineer for curing method options if above conditions cannot be met.

C. Verify compatibility of curing compounds with architectural finishes and subsequent materials to be applied to finished concrete.

D. Protection:

1. Protect concrete surfaces from damage by tools, equipment, materials, and construction activity.
2. Traffic, shoring, or loading will not be permitted on concrete surface until it has sufficiently hardened to prevent injury to finish and strength.

3.8 REMOVAL OF FORMS

A. Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 degrees F for 24 hours after placing concrete provided concrete is hard enough not to be damaged by form-removal operations and provided curing and protection operations are maintained.

B. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved the following:

1. At least 70 percent of 28-day design compressive strength.
2. Determine compressive strength of in-place concrete by testing representative field or laboratory-cured test specimens according to ACI 301.
3. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

3.9 CONCRETE REPAIRS

A. Defective Concrete: Concrete is deemed defective if it meets any of the following conditions:

1. Concrete not meeting 100% of the specified 28-day design compressive strength.
2. Concrete exhibiting rock pockets, voids, spalls, cracks, and exposed reinforcing to the extent that strength, durability, or appearance is adversely affected.
3. Concrete significantly out of place, line, or level.
4. Concrete not containing required embedded items.

B. Upon determination that concrete strength is defective core samples shall be taken and tested from the in-place concrete. Cores shall be taken and tested in accordance with ASTM C 42 and C 39. If required, perform structural repairs subject to the Engineer's approval.

C. Upon determination that concrete surface is defective repairs may be made per below. Repair work shall not begin until procedure has been reviewed and approved by the Engineer.

1. After form removal, cut out honeycomb, rock pockets, and voids more than 1/2 inch in any direction in solid concrete. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with drypack grout before bonding agent has dried.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, repair mortar will match surrounding color. Patch a test area at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed, formed surfaces that affect concrete's durability and structural performance as determined by Engineer.
4. Correct high spots by grinding after concrete has cured 14 days.
5. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar.
6. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply mortar underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
7. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least 3/4 inch clearance all around. Dampen concrete surface in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mix as original concrete.
8. Repair random cracks and single holes 1 inch or less in diameter with drypack grout. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place drypack grout before bonding agent has dried. Compact and finish to match adjacent concrete.

3.10 FIELD QUALITY CONTROL

A. Testing Service: Owner will select and pay for independent testing agency.

B. Test Specimen Cylinders: Conduct sampling, curing, and testing per ASTM C172, ASTM C31/C31M, and ASTM C39/C39M in accordance with CBC 1905.6.

1. Frequency: For each type of concrete, provide at least one set of 3 concrete test cylinders taken not less than once a day, or not less than once for each 50 cubic yards, or not less than once for each 3500 square feet of slab or wall surface area, or as required per plans.
2. Cylinder Label and Records: Mark and date each test cylinder. Maintain records of test specimen cylinders and send copies to Engineer and Owner. Record the following information:

    a. Cylinder identification mark.
    b. Date made.
    c. Concrete supplier.
    d. Slump.
    e. Specified concrete design strength.
    f. Pour location and type of structural member.
    g. Compressive strength test date and age.
    h. Admixtures added to concrete mix.

3. Compressive Strength Tests: Test laboratory cured specimens first at age 7 days, second at age 28 days, hold third specimen as reserve.
4. Test Reports: Furnish 2 copies of test reports directly from testing agency to Engineer and Owner.

C. Slump Test: Not required.

D. In the event the cylinders tested do not meet the required concrete design strength, conduct core tests and additional tests or inspections as may be required by Engineer to ascertain strength of placed concrete.

END OF SECTION 03 30 00

SECTION 03 39 00

CONCRETE CURING – PROACTIVE MOISTURE CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes

1. Penetrating moisture vapor emission control system for new concrete slabs to receive finished floor coverings or coatings.

B. Related Requirements:

1. Section 01 45 20, “Concrete Moisture Testing.”
2. Section 03 30 00, “Cast-in-Place Concrete.”

1.3 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

1.4 REFERENCE STANDARDS

A. ACI 302.1R-15 - Guide to Concrete Floor and Slab Construction

B. American Society for Testing and Materials (ASTM):

1. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
2. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes
3. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring

1.5 SUBMITTALS

A. Product data: Manufacturer's data sheets on each product being used, including:

1. Preparation instructions and recommendations
2. Storage and handling requirements and recommendations
3. Installation and application methods
4. 15-Year Warranty information

1.6 QUALITY ASSURANCE

A. Manufacturer's Representative: Manufacturer's Representative to train and supervise or have previously trained and supervised the applicator in the installation of the moisture control system, ensuring the installation conforms to manufacturer's Fifteen (15) Year Warranty requirements.

B. Applicator to submit Installation Record(s) and Installation photo documentation to Manufacturer for approval upon completion of installation for issuance of Manufacturer's Fifteen (15) Year Warranty.

C. Provide Manufacturer's standard Fifteen (15) Year Warranty at no additional cost.

1.7 DELIVERY, STORAGE AND HANDLING

A. Store products in an approved ventilated dry area; protect from dampness, freezing, and direct sunlight. Product shall not be allowed to freeze.

1.8 PROJECT/SITE CONDITIONS

A. Spray-apply penetrating moisture control system to the concrete slabs as soon as final finishing operations are complete and the concrete has hardened sufficiently to sustain foot traffic without damage.

B. Ensure no moisture has accumulated on the surface of the concrete prior to application.

C. Apply moisture control system when ambient temperature is above 22°F and slab temperature is above 34°F.

1.9 SCHEDULING

A. The moisture control system manufacturer's instructions must allow installation on the day of the pour, or as soon as weather conditions permit, prior to addition of any topical compounds.

B. Coordinate acclimatization of spaces and scheduling of tests to comply with requirements of the floor finish sections and the floor finish manufacturers' requirements.

1.10 WARRANTY

A. Manufacturer shall provide written warranty for their system installed on below-grade, on-grade, or above-grade concrete slab treated with the product according to manufacturer's instruction. The manufacturer shall warrant the floor finish against failure due to negative-side moisture migration or moisture-born contaminates such as alkalinity for a period of fifteen (15) years from the date of original installation. The warranty shall cover both labor and materials necessary to repair or replace the floor finish if repairs cannot be made.

B. Manufacturer to provide moisture control system warranty against failure of its system, workmanship, delamination, and other deterioration of floor finish installed over vapor emission control system due to moisture vapor emission or alkalinity.

C. Moisture control system warranty shall not have exclusions due to moisture vapor emission increase after system installation.

PART 2 - PRODUCTS

2.1 MANUFACTURER REQUIREMENTS

A. Penetrating moisture control system shall be applied the day of the concrete pour or as soon as weather permits, prior to any other chemical treatments for concrete slabs either on grade, below grade or above-grade.

1. Basis of Design: Creteseal CS200 is a specialty blended solution applied to freshly-placed concrete that fixates the calcium hydroxide. Application is typically performed on the same day as the concrete placement or as soon as job site weather conditions allow. The product is sprayed on and evenly distributed with a soft-bristle broom until it is completely absorbed within the slab. Creteseal CS2000 is designed to penetrate into the top portion of concrete floor slabs to form a moisture vapor and alkalinity control system.

B. Product to have at least a 5-year documented history in controlling moisture vapor emission from damaging floor covering, compatible with all floor finish materials.

PART 3 - EXECUTION

3.1 PREPARATION

A. Mix, place, and finish concrete in accordance with the guidelines set out by “ACI” committee 302 report, “Guide to Concrete Floor and Slab Construction” (ACI 302.1R-15).

B. Concrete shall have a designed water to cement ratio of .50 or less.

C. In preparation for installation of floor coverings, contractors must not burnish, polish, or mirror finish the concrete slab during final finishing operations. A burnished slab surface may act as a bondbreaker and render the slab incompatible with flooring adhesive products.

D. Apply any curing compounds or bond breaker products for casting panels following installation of penetrating moisture control system.

3.2 INSTALLATION

A. Spray-apply penetrating moisture control system to the concrete slabs as soon as final finishing operations are complete and the concrete has hardened sufficiently to sustain foot traffic without damage. Inclement weather such as rain, snow, cold, wind, or job-site conditions such as concrete not exposed to direct sunlight will affect the rate of concrete hydration and delay application of the moisture control system until a more suitable application time permits as directed by manufacturer.

B. Spray-apply penetrating moisture control system by spraying product at the rate of 200 square feet per gallon using a clean industrial concrete sprayer provided by manufacturer. Broom product evenly over the substrate until product has completely penetrated the surface.

C. If within two (2) hours after initial application areas are subjected to heavy rainfall and puddling occurs, reapply product to these areas as soon as weather condition permits. Allow additional cure time prior to flooring system placement.

3.3 TESTING

A. Allow sufficient time for the concrete the cure and hydrate prior to testing in accordance with the flooring manufacturer requirements.

1. If ASTM F1869 testing is performed, the surface shall be lightly sanded or cleaned to remove construction debris. The concrete surface shall not be ground.
2. If ASTM F2170 testing is performed, the in situ probe holes will be filled with manufacturer’s recommended polyurea filler or moisture resistant patch.

B. In the absence of any flooring manufacturer testing recommendations or requirements, perform calcium chloride testing in accordance with ASTM F1869 and ASTM F710.

C. Prior to moisture testing the building shall be enclosed and the HVAC system operational at least 48 hours prior to testing. The HVAC system must be left on during the duration of testing. The moisture test report shall detail climate conditions in accordance with ASTM F710, including minimum and maximum temperature parameters, as well as minimum and maximum ambient humidity parameters.

D. Submit moisture testing report to the Architect, Owner, General Contractor, and moisture control system Manufacturer.

END OF SECTION 03 39 00

SECTION 05 50 00

METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Miscellaneous steel framing and supports.
2. Steel framing and supports for mechanical and electrical equipment.
3. Steel framing and supports for applications where framing and supports are not specified in other Sections.

B. Related Requirements:

4. Structural Drawings for steel framing for supporting wood framed construction.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

B. Pre-installation Meeting: Convene one week before starting work of this section.

1.4 ACTION SUBMITTALS

A. Delegated-Design Submittal: For ladders, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

B. Product Data: For each type of product.

C. Shop Drawings:

1. Detail fabrication and erection of each ladder indicated. Include plans, elevations, sections, and details of metal fabrications and their connections.
2. Provide templates for anchors and bolts specified for installation under other Sections.
3. Provide reaction loads for each hanger and bracket.

D. Selection Samples: For each finish specified, two complete sets of color chips representing manufacturer's full range of available colors.

E. Verification Samples: For each finish specified, two samples, minimum size 6 inches square, represent actual product color.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in producing aluminum metal ladders similar to those indicated for this Project.

1. Record of successful in-service performance.
2. Sufficient production capacity to produce required units.
3. Professional engineering competent in design and structural analysis to fabricate ladders in compliance with industry standards and local codes.

B. Installer Qualifications: Competent and experienced firm capable of selecting fasteners and installing ladders to attain designed operational and structural performance.

C. Product Qualification: Product design shall comply with OSHA 1910.27 minimum standards for ladders.

1.4 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions by field measurement before fabrication.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, indicate established dimensions on shop drawing submittal and proceed with fabrication.

PART 2 - PRODUCTS

2.1 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

C. Steel Tubing: ASTM A 500/A 500M, cold-formed steel tubing.

D. Steel Pipe: ASTM A 53/A 53M, Standard Weight (Schedule 40) unless otherwise indicated.

E. Aluminum Sheet and Plates: ASTM B 209

F. Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes: ASTM B 221

G. OSHA 1910.27 – Fixed Ladders.

H. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

2.2 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Use connections that maintain structural value of joined pieces.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.

C. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended.

D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Locate joints where least conspicuous.

E. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

2.4 MISCELLANEOUS MATERIALS

A. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Shop Primers: Provide primers that comply with Section 09 91 13, "Exterior Painting." Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

C. Water-Based Primer: Emulsion type, anticorrosive primer for mildly corrosive environments that is resistant to flash rusting when applied to cleaned steel, complying with MPI#107 and compatible with topcoat.

D. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

E. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

F. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

G. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

H. Concrete: Comply with requirements in Section 03 30 00, "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi (20 MP)

2.5 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Use connections that maintain structural value of joined pieces.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.

C. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended.

D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Locate joints where least conspicuous.

E. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

F. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c.

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

2.9 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.

1. All exterior steel framing exposed to the weather shall be hot-dipped galvanized prior to painting.

B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

1. Shop prime with primers specified in Section 09 91 13, "Exterior Painting."

C. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction.

D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

E. Coordinate anchorages. Furnish setting drawings, templates, and anchorage structural loads for fastener resistance.

F. Do not begin installation until supporting structure is complete and ladder installation will not interfere with supporting structure work.

G. If supporting structure is the responsibility of another installer, notify Architect of unsatisfactory supporting work before proceeding.

H. Install ladders in accordance with manufacturer's instructions and in proper relationship with adjacent construction.

3.2 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION 05 50 00

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SECTION 06 10 00

ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Wood Framing.
2. Rough Hardware.
3. Plywood Sheathing.
4. Preservative Treatment.

B. Related Requirements:

1. Section 03 10 00, "Concrete Forming."
2. Section 03 30 00, "Cast-in-Place Concrete."
3. Section 06 17 53, "Fabricated Wood Trusses."
4. Section 06 18 00, "Glued-Laminated Construction."
5. See also non-structural specifications.

1.3 REFERENCE STANDARDS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of these Specifications.

C. Referenced Standards:

1. California Building Code (2016)
2. ASTM A123– Standard Specification for Zinc Coatings on Iron and Steel Products.
3. ASTM A307– Standard Specification for Carbon Steel Bolts and Studs.
4. WCLIB Rule 17 – Standard Grading Rules for West Coast Lumber.
5. WWPA – Standard Grading Rules for Western Lumber.
6. RIS – Standard Specifications for Grades of California Redwood Lumber.
7. Plywood – The Engineered Wood Association (APA); Plywood Specifications and Grades.
8. Wood Preservative – American Wood Preservative Association (AWPA).
9. NDS – National Design Specification for Wood Construction.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

B. Pre-installation Meeting: Convene one week before starting work of this section.

1.5 DESIGN REQUIREMENTS

A. Provide all labor, materials, tools, facilities, and equipment required for the fabrication and installation of rough carpentry and associated items.

1.6 SUBMITTALS

A. General: Submit as noted below and per division 1.

B. Certification:

1. Pressure Treated Wood: Certification for water-borne preservative that moisture content was reduced to 19% maximum after treatment.

1.7 QUALITY ASSURANCE

A. Coordinate the work of all trades to ensure proper placement of all materials, anchors, etc., as well as providing for openings and anchors for the installation of surface mounted materials and equipment.

B. Qualifications of Workmen: Provide sufficient skilled workmen and supervisors who shall be present at all times during execution of this portion of the work and who shall be thoroughly familiar with the type of construction involved and the materials and techniques specified.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protection:

1. After delivery, store all materials off the ground, covered, and in such a manner as to ensure proper ventilation and drainage and to protect against damage and the weather. Maintain wood at the maximum moisture levels indicated in Materials Section.
2. Keep all material clearly identified with all grade marks legible; keep all damaged material clearly identified as damaged, and separately store to prevent its inadvertent use. Do not allow installation of damaged or otherwise non-complying material.
3. Use all means necessary to protect the installed work and materials of all other trades.

B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Engineer.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Sawn Lumber:

1. Lumber (Wood Framing): Meet requirements of following minimum grades, unless noted otherwise on plans. All grades to WCLIB Grading Rules #17. Species shall be Douglas-Fir – Coast Region. At time of construction moisture content shall not exceed 19%.

   a. Wall Studs – as noted on plans.
   b. Top Plates – #2
   c. Sills and Plates – Stud grade
   d. Rim Joists – #2
   e. 2x and 4x Framing – #2
   f. 6x and Larger Framing – #1

2. All sawn lumber is assumed to be enclosed in the dry building envelope in the final service condition, unless noted otherwise, and free to dry to moisture content less than 19%.

B. Wood Sheathing:

1. Roof, Floor and Wall Structural Sheathing: PS1 and PS2 APA rated sheathing with exterior glue. Thickness, type, and grade shall be as indicated on drawings.

C. Plates, Blocking, Cast-in-Nailers at Concrete Curbs, or Sills on Concrete: Pressure-treated.

D. Building Paper: For vertical walls surfaces use Fortifiber Jumbo Tex HD 30, or approved equal, waterproof, conforming to Federal Specification UU B 790a, Type 1, Grade D, Style 2, ASTM F 1249, ASTM D779. Building paper for cement plaster wall surfaces shall be specified in section 9110-Lath and Plaster Substrate.

E. Waterproof membrane flashing: Waterproof membrane flashing shall be Bituthene or equal.

F. Preservative Treatment:

1. Per specifications on drawings.
2. Cut, bored or notched surfaces shall be retreated per AWPA.

G. Rough Hardware Fastenings and Connections: All types including bolts, lag screw, nails, spikes, screws, washers and other rough hardware, of kinds that may be purchased and that require no further fabrication, shall be furnished and installed for all finish and rough carpentry. All exterior hardware or hardware installed in pressure treated lumber shall be hot-dipped galvanized to a G-185 rating (per ASTM A653), batch/post hot dipped galvanized (ASTM A123 & A135), mechanically galvanized (ASTM B695), or stainless steel.

1. Common wire nails or spikes unless noted otherwise on the drawings. See required nail dimensions on drawings. Bore holes for nails wherever necessary to prevent splitting. Use finish or casing nails for finish work. Nails for exterior wood trim shall be galvanized. Box nails and sinker nails are not permitted.

2. Bolts: Bolts shall conform to ASTM A307, grade A, Hexagonal heads of sizes indicated. Holes shall be 1/16” larger than bolt diameter. Drive fit with washers under nuts. Malleable or plate washers shall be used where bolt heads or nuts bear on wood. Upset threads are not permitted.
3. Lag bolts: Bolts shall conform to ASTM A307, Grade A, Hexagonal heads, unless noted otherwise. Shall be screwed (not driven) into place. Use galvanized bolts wherever indicated.
4. Washers: Washers for bearing against wood shall be provided under all bolt heads and nuts. Malleable iron or steel plate having as area equal to 16 times the area of bolt or lag screw. Steel washers shall have a thickness not less than 1/10 the length of the washer's longest side. Malleable iron washers shall have a bearing surface for the nut or head equal in diameter to not less than the long diameter of the nut or head.
5. Powder Driven Fasteners: Tempered steel pins with special corrosive resistant plating or coating. Pins shall have guide washers to accurately control penetration. Fastening shall be accomplished by low-velocity piston-driven power activated tool. Pins and tool shall be as manufactured by Hilti Fastening Systems or accepted equal. See Drawings for size, type and embedment. All fasteners shall have ICBO approval.
6. Expansion Bolts: Hilti Fastening Systems "Kwik-Bolt Concrete Expansion Anchors" to concrete or approved equal. Install with minimum edge distance per drawings.
7. Fabricated Metal Timber Framing Connectors: Fabricate from hot-dipped galvanized steel. Connectors shall be punched for nailing and bolting. Nails and nailing shall conform to the manufacturer's instructions with a nail provided for each punched hole. Types as noted on Drawings. As manufactured by Simpson Strong Tie Co., or approved equal. All connectors must have specific ICBO approval. Do not substitute connectors manufactured by other than Simpson-Strong Tie, without written review by the Structural Engineer. All framing connectors shall be stamped with manufacturer’s logo and model designation.

H. Fire Retardant Lumber:

1. Per specifications on drawings. See SN.1A, Section 6.1-4.

2.2 FABRICATION

A. Lumber:

1. Air or kiln-dry to maximum 19% moisture content at time of installation.
2. Furnish S4S unless otherwise noted.
3. Size to conform to rules of governing standard. Sizes shown are nominal unless noted otherwise.

2.3 SOURCE QUALITY CONTROL

A. Grade mark each piece of lumber. Marking must be done by recognized agency.

1. Douglas Fir shall bear WCLIB grade stamp.
2. Pressure treated Douglas Fir shall bear AWPA Quality mark.

B. Wood Sheathing: Each panel shall be legibly identified as to type, grade and species by APA grade. If plies are spliced, the slope of the scarf shall not be steeper than 1:8.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Inspection:

1. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly proceed.
2. Verify that rough carpentry may be performed in strict accordance with the original design and all pertinent codes and regulations.

3.2 WORKMANSHIP

A. All rough carpentry shall produce joints true, tight, and well nailed with all members assembled in accordance with the drawings.

B. Selection of Lumber Pieces: Carefully select all members. Select individual pieces so that knot and defects will not interfere with placing bolts or proper nailed or making proper connections. Discard all defects which will render a piece unable to serve its intended function.

C. Lumber may be rejected by the Engineer, whether or not it has been installed, for excessive warp, twist, bow, crook, mildew, fungus or mold, as well as for improper cutting and fitting.

D. Shimming: Do not shim any framing component.

E. Care shall be taken that notching and boring of members is in strict conformance with the drawings and there are no overcuts.

3.3 FASTENING

A. Nailing: Except as otherwise indicated on drawings or specified, all nailing shall be as required by CBC Table 2304.9.1 Fastening Schedule.

1. Nails or spikes shall be common wire nails unless noted otherwise. Penetration of nails or spikes into the main member shall be (12) times the nail or spike diameter, unless noted otherwise on the drawings.

    a. Bore holes for nails wherever necessary to prevent splitting. Hole spitting shall not exceed 75% of nail diameter.
    b. Use finish or casing nails for finish work.
    c. Use of nailing guns is as limited by CBC. Nails installed with guns shall not penetrate into the outer plies deeper than hand nailing.

B. Bolts shall be of sizes indicated. Holes for bolts shall be 1/16” larger than the bolt. Drive fit with washers under head and nuts. Malleable or plate washers shall be used. Lag screws shall be screwed (not driven) into place with holes bored the same depth and diameter as shank. For threaded portion, holes shall be between 60% and 75% of the shank diameter. Retighten all bolts and screws before closing in.

C. Framing Devices: As specified under Products, sizes as indicated.

3.4 FRAMING AND ROUGH CARPENTRY

A. Sills: Shall be in long lengths of sizes shown, fastened with anchor bolts (or MAS or Powder Driven Fasteners as accepted per drawings) as indicated, a minimum of two (2) anchor bolts per piece and a bolt within 12" but not nearer than (7) bolt diameters from end of piece. Place malleable iron or steel plate washers (but not cut washers) under nuts bearing on wood. Set sills level and true.

B. Studs, Posts and Columns: Shall be full length. Corners shall be as detailed. Partitions or walls containing plumbing, heating or other piping shall be so formed as to give proper clearance for materials. Cut members as required to provide full bearing at ends. Connect to structure as indicated.

C. Plates: Shall be in long lengths and spliced as shown.

D. Blocking: Shall be same thickness and width of studs or joists unless shown otherwise. Install fire blocking in accordance with CBC. Install blocking at all plywood joints where noted on the drawings. Install solid blocking at floor joists beneath all posts in walls. Install backing for fastening all exterior and interior surface applied and recessed applied items or at all wall, floor or roof penetrations. Provide backing at all continuous eave vents and all other vents.

E. Joists and Beams: Shall be in long lengths and spliced over bearings unless shown otherwise. Install with crown side up. Beams or headers indicated to be built up of two or more joists shall be fabricated on the job using full length members. For two piece 2x members, stitch nail pieces together with 16d common nails spaced not over 12"o.c. and staggered. Clinch nails protruding through members. For larger piece members, stitch bolt pieces together with ½" bolts spaced not over 12"o.c. and staggered.

1. Provide double joists and headers at all openings through roof unless otherwise shown on drawings.
2. Provide typical headers at all openings through walls where one or more studs are required to be cut. For penetration through walls narrower than stud spacing, provide solid backing on all sides for fastening finish materials.

F. Plywood Structural Sheathing: Install to pattern indicated and provide blocking at joints where noted on the drawings. Center all joints over bearing supports. Nail to framing as indicated. Install plywood with face plies perpendicular to joists or studs unless indicated otherwise. Wall plywood sheathing shall continue uninterrupted by ceilings or soffit from floor to floor to roof unless specifically detailed on the drawings. Provide 1/8” gap between all panel joints (except at T&G).

G. Wood Furring, Stripping, and Grounds: Install as shown or required to provide nailing of materials or passage of pipes, conduits, etc., not otherwise accommodated including ceiling stripping for gypsum drywall construction. Install wood grounds for material as indicated and required.

H. Bridging: Space not over 8'-0"o.c. for spans over 16'-0". Spans over 8’-0” and under 16’-0” shall have bridging placed at midspan. Bridging shall be solid blocking or as indicated. Joists 8" or less in depth shall not require bridging unless specifically indicated. Drill attic bridging for ventilation as directed by architect.

I. Solid Wood Backing: Shall be provided for all wall and ceiling finishes and for the supporting and anchorage of products, fixtures and equipment for all trades, including handrails, guardrail brackets, metal toilet partitions, toilet room accessories, frames, cabinets, case work, mirrors, trim, applied wall finishes, athletic equipment, food service equipment, etc. Coordinate placement of backing and supports with manufacturer or supplier of mounted items.

J. Building Paper: Install per Architect.

K. Tongue and Groove Decking: Install across framing members. Nail decking as indicated and draw boards up tight.

L. Framing members shall not be notched or bored unless specifically detailed on the drawings.

3.5 MISCELLANEOUS CARPENTRY WORK

A. Miscellaneous Carpentry Work not included under other sections shall be furnished and installed hereunder as indicated. Carefully locate and securely anchor items furnished by other trades or under other sections of these specifications to the structure or structural framing.

B. Drypack: Drypack shall consist of one part high early strength Portland cement to not more than three parts of sand by volume. Add only a minimum amount of water to hold the mixture in shape while packing and to provide hydration. Solidly ram drypack into place to provide uniform bearing and cure with moist sacks or cloths for a period of at least three days.

C. Wood Curbs for Equipment: Construct all wood curbs for roof mounted equipment as detailed. Provide all miscellaneous blocking, bracing, supports, and other wood items as shown or required to complete the work. Provide all wood framed openings through structural system where pre-fabricated metal curbs, equipment, etc. is to be located on roofs, platforms, through walls, or any other framed component of the structure.

D. Plywood Backing for Electrical, telephone, and similar types of wall mounted equipment shall be provided hereunder where required. Plywood shall be 3/4" thick exterior A-C plywood with 'A' face exposed.

E. Fire/Draft Stops: Construct fire and drafts stops in attic spaces where indicated or required by CBC. Construct of not less than 5/8” Type 'X' gypsum wallboard or ½" plywood, adequately supported. Draft stop and installation work shall conform to CBC requirements.

F. Shoring and Bracing: Shore or brace for temporary support of all work as required during the construction period except any shoring and bracing specified and included under other sections of these specifications.

G. Temporary Enclosures: Provide and maintain all barricades and enclosures required to protect the work in progress.

H. Protect all work in progress and all work installed, as well as the work of all other trades. Any work damaged as a result of the work under this section shall be corrected to its original condition or replaced.

I. Protect preformed metal roofing by approved method should any work be required on roof after roofing installation.

3.6 FRAMING TOLERANCES

A. Maximum variation from true flatness: ¼” in 10’-0” in any direction.

3.7 CLEAN-UP

A. Upon completion of the work of this section, remove all surplus materials, rubbish and debris from the premises.

END OF SECTION 06 10 00

SECTION 06 16 00

SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Wall sheathing.
2. Roof sheathing.
3. Sheathing joint and penetration treatment.

B. Related Requirements:

1. Section 06 10 00, "Rough Carpentry."
2. Section 07 25 00, "Weather Barriers."
3. Section 07 62 00, "Sheet Metal Flashing and Trim."
4. Section 07 92 00, "Joint Sealants."

1.3 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
3. For fire-retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5516.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.4 INFORMATIONAL SUBMITTALS

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance Ratings: Indicated by design designations from GA-600, "Fire Resistance Design Manual".

2.2 WOOD PANEL PRODUCTS

A. Emissions: Products shall meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. Certified Wood: For the following wood products, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

1. Plywood.
2. Oriented strand board.

C. Plywood: DOC PS 1.

D. Oriented Strand Board: DOC PS 2.

E. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.

F. Factory mark panels to indicate compliance with applicable standard.

2.3 PRESERVATIVE-TREATED PLYWOOD

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.

C. Application: Treat items indicated on Drawings and plywood in contact with masonry or concrete or used with roofing, flashing, vapor barriers, and waterproofing.

2.4 WALL SHEATHING

A. Plywood Wall Sheathing: As indicated on drawings

1. Span Rating: As indicated on drawings.
2. Nominal Thickness: As indicated on drawings.

B. Oriented-Strand-Board Wall Sheathing: As indicated on drawings.

1. Span Rating: As indicated on drawings.
2. Nominal Thickness: As indicated on drawings.

2.5 ROOF SHEATHING

A. Plywood Roof Sheathing: As indicated on drawings.

1. Span Rating: As indicated on drawings.
2. Nominal Thickness: As indicated on drawings.

B. Oriented-Strand-Board Roof Sheathing: As in sheathing.

1. Span Rating: As indicated on drawings.
2. Nominal Thickness: As indicated on drawings.

2.6 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. For roof and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: NES NER-272.

D. Wood Screws: ASME B18.6.1.

E. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

1. For wall and roof sheathing panels, provide screws with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

F. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

1. For steel framing less than 0.0329 inch (0.835 mm) thick, use screws that comply with ASTM C 1002.
2. For steel framing from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick, use screws that comply with ASTM C 954.

G. Screws for Fastening Oriented-Strand-Board-Surfaced, Polyisocyanurate-Foam Sheathing to Metal Roof Deck: Steel drill screws, in type and length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117. Provide washers or plates if recommended by sheathing manufacturer.

2.7 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

A. Sealant for Paper-Surfaced Gypsum Sheathing: Elastomeric, medium-modulus, neutral-curing silicone joint sealant compatible with joint substrates formed by gypsum sheathing and other materials, recommended by sheathing manufacturer for application indicated and complying with requirements for elastomeric sealants specified in Division 07 Section "Joint Sealants."

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's "International Residential Code for One- and Two-Family Dwellings."

D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.

E. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.

B. Fastening Methods: Fasten panels as indicated below:

1. Wall and Roof Sheathing:

a. Nail to wood framing.
b. Screw to cold-formed metal framing.
c. Space panels 1/8 inch (3 mm) apart at edges and ends.

END OF SECTION 06 16 00

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SECTION 06 17 33

WOOD I-JOISTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Wood I-Joists.
2. Wood I-Joist Bridging, Bracing, and Anchorage.
3. Wood I-Joist Fasteners.

B. Related Requirements:

1. Section 06 10 00, "Rough Carpentry."
2. Section 06 18 00, "Glued-Laminated Construction."
3. See also non-structural specifications.

1.3 REFERENCE STANDARDS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of these Specifications.

C. Referenced Standards:

1. California Building Code (2019)
2. WCLIB – West Coast Lumber Inspection Bureau.
3. WWPA – Western Wood Products Association.
4. NFPA – National Forest Products Association.
5. AWPA – American Wood Preservative Association.
6. APA – The Engineered Wood Association.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."

2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

B. Pre-installation Meeting: Convene one week before starting work of this section.

1.5 DESIGN REQUIREMENTS

A. Provide all labor, materials, tools, facilities, and equipment required for the fabrication and installation of wood I-joists.

1.6 SUBMITTALS

A. General: Submit as noted below and per division 1.

B. Shop Drawings: As required per drawings submit shop drawings indicating the sizes, types, and spacing of joists, loads and joist cambers, framed openings, blocking, bracing, and hanger information with sufficient detailing to ensure correct installation.

1.7 QUALITY ASSURANCE

A. Perform work in accordance with the following agencies:

1. Lumber Grading Agency: Certified by ALSC
2. Structural Panel Grading Agency: Certified by APA
3. Manufacturing Facility: Approved by an independent ICBO approved inspection agency.

B. All joists shall bear a stamp indicating the joist type, report number, manufacturer’s name, plant number, and the independent inspection agency.

1.8 DELIVERY, STORAGE, AND HANDLING

A. If joists are stored prior to installation they shall be stored in a vertical position off the ground and covered and protected from weather, and per the joist manufacturer.

B. Use equipment and methods that avoid damages that may impair the strength of the joists. Sharp instruments and unprotected wire rope, chain slings and the like shall not be permitted.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Wood I-Joists shall be of the types and sizes indicated on the drawings. If other manufacturer’s joists are used they shall be subject to the Engineer’s review upon submission of substantiating data, and may only be used if equivalent, in the Engineer’s opinion, to wood I-Joists specified. Any substitutions for joists shall meet the proprietary floor assembly requirements for fire rating, and sound and impact requirements per architectural plans. All joists shall have a current ICC evaluation report.

B. Lumber: All lumber used in the manufacturing of the wood I-Joists shall be graded by the NFPA, WCLIB or WWPA.

1. Specific gravity of top and bottom flanges = 0.49 minimum.

C. Manufactured Wood Material: All manufactured material used in the manufacturing of the wood I-Joists shall have a current ICC evaluation report. All sheathing material used for webs shall be APA rated sheathing conforming to PS1 or PS2.

1. Specific gravity of top and bottom flanges = 0.49 minimum.

D. Adhesive: Adhesive shall have a current ICC evaluation report.

E. Accessories:

1. Hangers, brackets, straps, ties, etc., as shown on drawings.
2. Blocking as shown on drawings.

PART 3 - EXECUTION

3.1 FABRICATION

A. Fabrication shall be in compliance with specified standard and industry specifications and requirements of the manufacturer's current ICC evaluation report.

1. Fabrication shall be in accordance with best practices with adequate plant and equipment and under supervision of properly qualified personnel.
2. Moisture content of components at time of gluing shall not be less than 7% nor more than 16%.

3.2 EXAMINATION

A. A. Verify that supports and openings are ready to receive joists. Coordinate placement of support items.

3.3 INSTALLATION

A. Install joists in accordance with the drawings and manufacturer's specifications. Comply with all manufacturers' recommendations concerning temporary construction loads and erection bracing.

B. Set structural members level and plumb, in correct position.

3.4 CLEAN-UP

A. Upon completion of the work of this section, remove all surplus materials, rubbish and debris from the premises.

END OF SECTION 06 17 33

SECTION 06 17 53

FABRICATED WOOD TRUSSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Fabricated Wood Trusses.
2. Fabricated Wood Truss Bracing.
3. Fabricated Wood Truss Hardware.

B. Related Requirements:

1. Section 06 10 00, "Rough Carpentry."
2. Section 06 18 00, "Glued-Laminated Construction."
3. See also non-structural specifications.

1.3 REFERENCE STANDARDS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of these Specifications.

C. Referenced Standards:

1. California Building Code (2016)
2. WCLIB – West Coast Lumber Inspection Bureau.
3. NDS – National Design Specification for Wood Construction.
4. TPI – Truss Plate Institute: Design Specification for Light Metal Plate Connected Wood Trusses.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."

2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

B. Pre-installation Meeting: Convene one week before starting work of this section.

1.5 DESIGN REQUIREMENTS

A. Furnish all material, equipment and labor necessary for the prefabrication, delivery and temporary setting of the wood trusses on plate line as shown on the drawings and all miscellaneous parts, including bridging, temporary and permanent bracing and all related items of hardware.

1.6 SUBMITTALS

A. General: Submit as noted below and per requirements of architect.

B. Shop Drawings: As required per drawings submit shop drawings prior to fabrication and erection.

1. Submit calculations and erection layouts to the Engineer for approval of adequacy of members proposed. Calculations shall be prepared and signed by licensed civil or structural engineer.
2. Drawings shall be furnished by the manufacturer showing all critical dimensions for determining fit and placement in the building as well as the loads the products are designed to support. Provide elevations of each truss type indicating dimensions, loading, reaction and member and plate sizes. Drawings shall also indicate sizes and location of bracing, blocking, hangers, etc., with sufficient detailing to ensure correct installation

1.7 QUALITY ASSURANCE

A. All trusses shall be marked with the manufacturer’s name and truss type keyed to the erection plans.

B. All connector plates shall be marked with the manufacturer’s name.

C. All trusses shall bear TPI Quality Control marks.

D. Qualifications of Manufacturer:

1. Provide connector plates manufactured by a member of TPI. Comply with TPI quality control procedures.
2. Truss Fabricator to participate in TPI “Quality Assurance Inspection Program” as a licensee authorized to apply TPI marks to trusses.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Handle and store trusses with care, and in accordance with the manufacturer’s instructions and TPI recommendations to avoid damage from bending, overturning or other cause for which truss is not designed to resist or endure. Store off the ground.

B. Time delivery and erection of trusses to avoid extended on-site storage and to avoid delaying work of other trades whose work must follow erection of trusses.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Trusses:

1. Lumber: All lumber used for truss members shall conform to the published stress ratings for the species and grades. The moisture content of all lumber shall not exceed 19% nor be less than 7% at the time of fabrication.
2. Lumber Species: Douglas Fir #2 and better for all members, unless otherwise approved by Engineer.
3. Connectors: All truss connector plates shall be manufactured from quality galvanized sheet steel of no less than 20 gauge thickness which has a minimum yield of 33,000 psi and a minimum thickness ultimate tensile strength of 45,000 psi. The corrosion resistant coating shall be 1.25 oz. per square foot commercial class hot dipped galvanized. All plates shall conform to ASTM A446, Grade A and shall be ICBO approved.

2.2 DESIGN

A. Engineering design shall account for all loads indicated and all mechanical units in conformance with the referenced codes.

B. Truss profiles shall allow for ducting from mechanical units.

C. Allowable stress increase for load duration shall be per drawings.

D. Increases in allowable stresses for repetitive members shall be as approved by Engineer.

E. Design and construction of connections shall be in accordance with published approvals of ICBO.

F. If trusses are required to support fire sprinkler systems, truss designer shall incorporate one 250# vertical load on the bottom chord of all trusses from fire sprinkler line. Truss must be designed to carry the load at any panel point along the bottom chord.

G. Truss layout shall be as shown on the structural drawings. Do not deviate without obtaining written approval from the structural engineer prior to preparing shop drawings.

2.3 FABRICATION

A. All items specified to be fabricated hereunder shall be accurately cut or fitted, and rigidly fastened to produce quality trusses in accordance with designs and criteria contained in these specifications and the drawings.

B. Cut truss members to accurate lengths, angles and sizes to produce close fitting joints with proper wood-to-wood bearing in assembled units.

C. Fabricate metal connector plates to proper size, configuration, thickness and anchorage details required for types of joint designs indicated.

D. Assemble truss members in design configuration indicated using jigs or other means to ensure uniformity and accuracy of assembly with close fitting joints. Position members to produce design camber as required.

E. Truss designer shall oversize plates for chord members to account for wood defects like knots, knotholes and greatly distorted grains. Maximum allowable defect size per member shall be 2 square inches. No defects allowed under plates for web members.

F. Built up girder trusses shall be laminated per truss designer.

G. Gable end trusses shall be 2x verticals at 16"o.c. typical unless noted otherwise.

H. All hardware required for connecting trusses (Jack to Hip, Hip to Girder, or Girder to Girder, etc.) shall be designed, detailed and provided by truss fabricator and shall meet minimum requirements shown on drawings.

I. Truss manufacturer to verify all dimensions shown on Structural Drawings with Architectural drawings and in field with wall layout prior to fabrication.

PART 3 - EXECUTION

3.1 ERECTION AND INSTALLATION

A. General: Erect and brace trusses to comply with recommendations of manufacturer and TPI.

B. Erect trusses with planes of truss webs vertical (plumb) and parallel to each other, locate accurately at design spacings indicated.

C. Hoist units in place by means of proper lifting equipment suited to sizes and types of trusses required, applied at proper lift points as recommended by Fabricator, exercising care not to damage truss members or joints by out-of-plane bending or other causes.

D. Provide temporary bracing as required to maintain trusses plumb, parallel and in proper location, until permanent bracing is installed.

E. Anchor trusses securely at all bearing points to comply with methods and details indicated.

F. Install permanent bracing, end pieces, blocking and related components to enable trusses to maintain design spacing, withstand live and dead loads including lateral loads, and to comply with other indicated requirements.

G. Do not cut or remove truss members.

H. Provide Simpson DTC, STC roof truss clips at all cross points between truss members and non-load bearing walls to provide for alignment control and truss movement when full dead loads are applied. Make sure slot nails are installed at the middle of the slot.

END OF SECTION 06 17 53

SECTION 06 18 00

GLUED-LAMINATED CONSTRUCTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Glued-Laminated Wood Beams.

B. Related Requirements:

1. Section 06 10 00, "Rough Carpentry."
2. Section 06 17 33, "Wood I-Joists."
3. See also non-structural specifications.

1.3 REFERENCE STANDARDS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of these Specifications.

C. Referenced Standards:

1. California Building Code (2016)
2. NDS – National Design Specification for Wood Construction.
3. AITC 117 – Standard Specifications for Structural Glued-Laminated Timber of Softwood Species.
4. ANSI A190.1 – Structural Glued-Laminated Timber.
5. ASTM D2559 – Standard Specifications for Evaluation of Structural Composite Lumber Products.
6. NER 486 – EWS Glued-Laminated Timber Combinations and “GAP” Computer Program for Determining Design Stresses.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

B. Pre-installation Meeting: Convene one week before starting work of this section.

1.5 DESIGN REQUIREMENTS

A. Provide all labor, materials, tools, facilities, and equipment required for the fabrication and installation of glued-laminated wood members.

1.6 SUBMITTALS

A. General: Submit as noted below and per division 1.

B. Shop Drawings: As required per drawings submit shop drawings indicating all pieces with pertinent dimensions, sizes, connections, and installation requirements, species of wood, stress grade of lumber, type of glue, laminating combination and other pertinent data relating to fabrication of glued-laminated beams and laminated veneer lumber.

1.7 QUALITY ASSURANCE

A. Each member shall be stamped with an identifying mark. Mark shall include all pertinent data, such as grade and species of lumber, type of glue, etc. A certificate of compliance shall be provided with the above data. All other glued-laminated beams shall have an approved ICC evaluation report.

B. Except as otherwise specified design, fabrication, and construction of structural glued-laminated lumber shall conform to the requirements as set forth in ANSI A190.1 and requirements in CBC Chapter 23.

C. Factory glued-laminated timber units shall be produced by an AITC licensed fabricator qualified to issue the AITC “Quality Inspected” mark.

D. Defective Beams: Glued-laminated beams not meeting design requirements, finish and workmanship as specified, or showing any evidence of separation of glue line or laminations shall be deemed defective and shall cause for rejection of entire member.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver undamaged products to site in manufacturer’s protective wrappings with legends intact. Store on site secure from weather, soil and physical damage. Maintain wrappings until immediately prior to installation.

B. Transport, handle and store in strict accordance with the manufacturer’s recommendations. Use padded, non-marring slings.

PART 2 - PRODUCTS

2.1 GLUED-LAMINATED BEAMS

A. Material: Douglas fir or Larch combination, fabricated in accordance with ANSI A190.1 and AITC 117.

1. Symbol 24F-V4 (DF/DF) for blocking, purlins, and simple span girders.
2. Symbol 24F-V8 (DF/DF) for cantilever girders and girders continuous over supports and where indicated on the drawings.

B. Camber: Provide camber to members as indicated on the drawings.

C. Workmanship: Fabrication shall be in accordance with the best practices with adequate plant and equipment and under supervision of properly qualified personnel. End joints shall be spaced 6” minimum in any lamination and between adjacent laminations for 1/8 of the depth of the beam plus one lamination as follows:

1. Simple beams – 100% of the span at the tension face.
2. Continuous or cantilever beams – continuous on both faces.

D. Appearance: AITC 110 Industrial appearance grade for concealed uses. AITC 110 Architectural appearance grade for exposed uses.

E. Shop Sealing: All surfaces shall receive one factory-applied coat of clear penetrating sealer suitable for application of subsequent finish coats.

F. One-Hour Fire-Rated Members: Glulam members specified on the plans as one-hour fire-rated shall have one additional tension lamination on the tension face of the member. Balanced beam layups shall have an additional tension lamination on both tension faces. Fire-rated members shall be marked “Fire-rated one-hour” by the manufacturer.

2.2 FABRICATION

A. Laminations with warp, twist, or other characteristics which will prevent intimate contact of adjacent glued faces or interfere with uniform bending to a required curvature when under clamping pressure shall not be permitted. Surfaces to be glued shall be clean and free from oil, dust and other foreign material which would be detrimental to satisfactory gluing.

B. Moisture content at time of gluing shall not be less than 7% nor more than 12%.

PART 3 - EXECUTION

3.1 INSPECTION

A. Visually inspect in field all glued-laminated members, laminated veneer lumber and laminated strand lumber for defects prior to erection. Notify Engineer of defects found. Do not proceed until discrepant areas have been fully resolved.

3.2 INSTALLATION

A. Erect glued-laminated members as indicated. Comply with AITC 111 and manufacturer's instructions.

B. Apply an approved end sealer to any member requiring cutting and trimming in the field.

C. Allowable holes: as noted on the structural plans.

3.3 CLEAN-UP

A. Upon completion of the work of this section, remove all surplus materials, rubbish and debris from the premises.

END OF SECTION 06 18 00

SECTION 06 20 13

EXTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Exterior building millwork including, but not necessarily limited to, the following:

a. Decorative Eave Brackets, painted..

2. Installation hardware and other items specified under other Sections where not installed by manufacturer or supplier.
3. Finish hardware items integral with exterior finish carpentry.

B. Related Requirements:

1. Section 07 62 00, "Sheet Metal Flashing and Trim."
2. Section 09 91 13, "Exterior Painting."

1.3 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures."

1.4 ACTION SUBMITTALS

A. Shop Drawings:

1. Submit for custom-fabricated items and as required for coordination to show locations and types of blocking and other anchors to be built into substrates.
2. Include "to-scale" dimensioned plans and elevations and large-scale details identifying components used, materials, finish, full-size profiles, and indicating method of attachment.
3. Cross reference to details numbering used on the Drawings.

B. Product Data: Manufacturer’s descriptive literature and standard drawings for stock products and materials to be used including:

1. Paints and stains applied under this Section.
2. Preservative-treated wood process.

C. Samples:

1. Graded wood samples for Architect's review and approval for each category of work.

a. Selected typical profiles as requested by Architect.
b. Submit for acceptance prior to wood purchase and millwork fabrication.
c. Provide specified paint or stain finish applied in step fashion to samples showing unfinished wood and each applied coating.

2. Exposed hardware.
3. Additional Samples: As requested by Architect.

1.5 INFORMATIONAL SUBMITTALS

A. Compliance Certificates:

1. For lumber that is not marked with grade stamp.
2. For preservative-treated wood that is not marked with treatment quality mark.

1.6 QUALITY ASSURANCE

A. Exterior finish carpentry shall comply with the applicable requirements of the "Architectural Woodwork Standards (AWS),” Edition 1 published jointly by WI, AWI, and AWMAC (hereinafter also referred to as the "woodworking standard") including Section 6, "Interior and Exterior Millwork," and applicable requirements of Appendix A. Where Contract Documents indicate requirements that conflict with or augment the woodworking standard, comply with the conflicting or augmenting requirements.

B. Mockup: Provide large scale mock-ups of installed siding materials to finalize the staining and finishing process as instructed by the Architect.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect millwork during transit, delivery, storage, and handling to prevent damage, soiling, and deterioration prior to installation on the Buildings.

B. Protect sheet materials from breakage and damage while unloading and when stored.

C. Comply with additional requirements specified in Section 01 60 00, "Product Requirements."

PART 2 - PRODUCTS

2.1 WOOD MATERIALS AND COMPONENTS

A. Lumber - General:

1. Use only lumber conforming to grades and dress sizes permitted within the applicable grading rules.
2. Lumber shall be new, uniformly sized and S4S unless otherwise specified or noted on the Drawings.
3. Mark each piece of lumber for use in structural framing with the grade and trade mark of a lumber grading organization.
4. Do not mark or color lumber, except where such marking will be concealed in finish work.
5. Sizes indicated are nominal, unless otherwise indicated.
6. Intended Finishes: As specified.
7. See Drawings for required species at each location.
8. No fingerjointed, twisted, warped, bowed, or otherwise defective lumber wood will be allowed.

B. Douglas Fir:

1. Grade: WCLIB No. 1.
2. Texture: S4S.
3. Member Sizes: As indicated on the Drawings.

2.2 WOOD-PRESERVATIVE-TREATMENT FOR DOUGLAS FIR

A. Wood-Preservative Pressure Treatment:

1. Process: In accordance with AWPA U1 and T1 Standards. Borate and CCA treatments are not acceptable.

    a. Above Ground Use: ACQ to not less than 0.25 retention, or CBA-A to not less than 20 percent retention.
    b. Ground Contact and Deck Framing Use: - Category UC4A: ACQ to not less than 0.40 percent retention.
    c. Permanent Below Grade- Category UC4B: ACQ to not less than 0.60 percent retention.

2. Stains or paints shall be compatible with above-ground pressure-treated wood products.

B. Kiln dry after treatment to a maximum moisture content of 19 percent.

C. Preservative Chemicals: Acceptable to authorities having jurisdiction.

D. Do not use chemical formulations that contain colorants or that bleed through or otherwise adversely affect finishes.

E. Lumber shall not be marked. Provide certificates of treatment compliance issued by inspection agency.

2.3 ACCESSORIES

A. General:

1. Fabricate and/or supply accessories to the details shown on the Drawings and as accepted. Size and type to suit application as accepted.
2. Where above grade pressure-treated wood may have excess surface chemicals making it potentially more corrosive, use stainless steel fasteners and connectors in lieu of hot-dip galvanized.

B. Rough Hardware:

1. Provide as required for installation.
2. Except as otherwise specified, metal fastenings and accessories shall hot-dip galvanized in accordance with ASTM A123, A153, or A653 as applicable.
3. Fastenings in contact with above ground use pressure-treated wood shall be hot-dip galvanized to G90 coating standard.
4. Fastenings in contact with ACQ and other pressure-treated wood retention levels greater than 0.40 pcf shall be Type 304 or Type 316 stainless steel.

C. Manufactured Fasteners: Class G185 sheet of ASTM A653 or better; “ZMAX” or “HDG” Series by Simpson Co., or accepted equal.

D. Handrail Brackets: As selected by Architect, generally conforming to profile shown, and designed to accept round handrail; Ives or accepted equal.

2.4 FABRICATION

A. Fabricate to profiles and designs shown on the Drawings, reviewed submittals, and Section 6 of the WI Standard.

B. Coordinate with structural work where trim interfaces with exposed wood members provided on Structural Drawings.

C. Provide wood members in maximum possible lengths to minimize joints.

D. Deck Support Framing:

1. Species: Unless otherwise noted, framing lumber shall be Pressure-Treated Douglas Fir as specified.
2. Dimensions: Ripped from 2 x lumber to achieve finish deck surface elevation shown.
3. Wood-Preservative Pressure Treatment: AWPA's UC4A Ground Contact preservative retention levels using ACQ or other acceptable treatment. CCA is not acceptable.

2.5 FINISHING

A. General:

1. Prepare for finishing and shop or field finish in accordance with AWS factory finishing requirements as specified in Section 5 of the AWS.
2. Field-applied coatings shall conform to Section 09 90 00, "Painting and Coating."

B. Cedar shall be shop finished prior to delivery to project to greatest extent possible.

C. Finished wood shall be sealed by priming on all cut edges, backs and other areas concealed in final work. Assure field-finished wood complies with this requirement prior to installation.

D. Finished wood shall be sealed by priming on all cut edges, backs and other areas concealed in final work prior to installation.

E. Coordinate application of sealing and priming concealed surfaces with Section 09 90 00, “Painting and Coating.”

PART 3 - EXECUTION

3.1 PREPARATION

A. Wood Preservatives:

1. General: Except where specifically excluded on the Drawings, all wood to be in contact with ground or cementitious materials shall have been pressure-treated as specified.
2. Field Application: Wood preservatives shall not be applied in the field except as described below.
3. Additional Application: When any framing, cutting, or boring of treated timber is performed after treatment, thoroughly swab all cuts, dips, and holes with an accepted preservative.

3.2 INSTALLATION

A. Install exterior millwork plumb, true, and in accordance with the Drawings and AWS Standard.

B. Cutting and Fitting:

C. Accurately cut and frame all lumber and timber to a close fit, with even bearing over all contact surfaces.

D. Form all joints square and tight unless otherwise shown. Do not use shims when making joints.

E. Install matching trim at joints, corners, and other exposed edges.

F. Install items specified in this Section, and items specified under other Sections which are not to be installed by manufacturer or supplier.

1. Install in accordance with the Drawings, manufacturer's printed instructions, and any additional requirements included in the respective Specification Section.
2. Wall-mounted items shall be securely fastened to solid backing or blocking.

3.3 FASTENING

A. General:

1. Use specified non-corroding fasteners for installation of exterior work.
2. Countersink and fill all finish nail heads.
3. Where other anchorage is indicated, use appropriate rough hardware.

4. Hammer, tool marks, and marred surfaces and edges are not acceptable on exposed surfaces.
5. Exposed fasteners shall be carefully aligned in both directions and uniformly spaced.
6. Turn up and make tight all nuts, bolts, and lag screws at time of installation and again at the completion of the work, to insure that shrinkage has been overcome and fastenings are tight.

B. Nails, Screws and Bolts:

1. Nails: Seat flush. Countersink all finishing nails to 1/16 inch below finish surface.
2. Screws:

    a. Drill holes for screws and lag screws same diameter as inner shank (bolt size minus depth of thread).
    b. Unless noted otherwise, countersink screws until heads are flush with finish surface.

3. Bolts:

    a. Pre-drill holes for countersunk bolts with a bit 1/16 inch larger than the accompanying washer, and to a depth which allows bolt head to be secured flush with finish surface.
    b. Where bolts are not countersunk, bore hole to accept bolt only. Tighten bolt and washer flush to finish surface without compressing wood.

C. Pins, Dowels and Spikes:

1. Untreated Timber: Bore holes for drift pins and dowels with a bit 1/16 inch less in diameter than the pin or dowel.
2. Treated Timber: Bore holes for drift pins and dowels with a bit of the same diameter as the pin or dowel.
3. Wire Spikes: Bore holes in small timbers for wire spikes with a bit of the same diameter or smallest diameter of the spike, where necessary to prevent splitting.

D. Washers:

1. Cut Washers: Fit all bolts 5/8 inch in diameter or less with cut washers.
2. Cast Washers: Fit all bolts and lag screws over 5/8 in. in diameter with cast or malleable iron washers, unless otherwise shown on the Drawings.

E. Toe Nailing:

1. General: When toe nailing of structural members is required, toe nailing shall be at an angle and penetration to firmly secure member.
2. Corrections: Remove and replace toe nails visible in the finish work which miss or partially miss adjoining wood members.

F. After completion of installation, clean exposed surfaces, touch up finish as required, remove and refinish damaged or soiled areas of finish, and adjust and repair damaged or defective work as directed.

3.4 FIELD FINISHING

A. Prime and Finish Coats: As specified in Section 09 91 13, "Exterior Painting." Primer may be shop applied where applicable.

B. Bolt Holes: Apply prime coats and finish coats to bolt holes made in wood after initial priming and finishing.

END OF SECTION 06 20 13

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SECTION 07 14 16

COLD FLUID-APPLIED WATERPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Cold fluid-applied waterproofing, dual waterproofing system for vertical and horizontal applications.
2. Waterproofing membrane, primer, protective waterproofing courese, and drainage.
3. Fully reinforced, two-component, fast-curing, polyurethane-methacrylate (Puma) resin flashing system.

1.3 RELATED REQUIREMENTS

1. Section 03 31 00, "Cast-in-Place Concrete" for moisture curing of concrete waterproofing substrate.
2. Division 07 air barrier section for wall waterproofing and interface coordination.
3. Section 07 92 00 "Joint Sealants" for joint sealants and accessories and joint preparation.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

1.5 REFERENCES

A. References, General: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section.

B. ASTM International (ASTM):

1. ASTM C 836 – Standard Specification for High-Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course
2. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants
3. ASTM D 4258 - Standard Practice for Surface Cleaning Concrete for Coating
4. ASTM D 4263 - Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
5. ASTM D 4716 - Standard Test Method for Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head
6. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials
7. ASTM E 96/E 96M - Standard Test Methods for Water Vapor Transmission of Materials

C. UL Environment Greenguard Certification: www.greenguard.org

1. Greenguard Certification Product Guide

D. U. S. Environmental Protection Agency (EPA): www.epa.gov:

1. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings

1.6 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Conference: Conduct conference at Project Site.

1. Review requirements for waterproofing products and installation, including surface preparation, substrate conditions, project and manufacturer's details, installation procedures, mockups, testing and inspection requirements, protection and repairs, and coordination and sequencing of waterproofing work with work of other Sections.

1.7 ACTION SUBMITTALS

A. Product Data: For each type of waterproofing product specified, including:

1. Technical data indicating compliance with requirements.
2. Substrate preparation instructions and recommendations.

B. Shop Drawings: Show locations for waterproofing system components. Show details for each type of substrate, joints, corners, and edge conditions, including flashings, counterflashings, penetrations, transitions, and terminations.

1.8 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, manufacturer, and waterproofing Inspector.

1. Certification of manufacturer's approval of Installer.

B. Low-Emitting Product Certificate: For waterproofing products specified to meet volatile organic emissions standards, submit Greenguard Certification or comparable certification acceptable to Architect.

C. Product Test Reports: Test data for waterproofing products and waterproofing system, by qualified testing agency, indicating proposed waterproofing meets performance requirements, when requested by Architect.

D. Warranty: Sample of unexecuted manufacturer and installer special warranties.

E. Field quality control reports.

1.9 QUALITY ASSURANCE

A. Installer Qualifications: A manufacturer-approved firm with minimum three years experience in installation of specified products in successful use on similar projects, employing workers trained by manufacturer, including a full-time on-site supervisor with a minimum of three years experience installing similar work, and able to communicate verbally with Contractor, Architect, and employees.

B. Manufacturer Qualifications: A qualified manufacturer with minimum five years experience in manufacture of waterproofing as one of its principal products.

1. Manufacturer's product submitted has been in satisfactory operation on five similar installations for at least five years.
2. Approval of Manufacturers and Comparable Products: Submit the following in accordance with project substitution requirements, within time allowed for substitution review:

    a. Completed and signed Substitution Request form.
    b. Product data, including certified independent test data indicating compliance with requirements.
    c. Sample shop drawings from similar project.
    d. Project references: Minimum of five installations of similar system not less than five years old, with Owner and Architect contact information.
    e. Name and resume of proposed qualified Inspector.
    f. Sample warranty.

C. Waterproofing Inspector Qualifications: A technical representative of manufacturer not engaged in the sale of products and experienced in the installation and maintenance of the specified waterproofing system, qualified to perform observation and inspection specified in Field Quality Control Article, to determine Installer’s compliance with the requirements of this Project, and approved by the manufacturer to issue warranty certification. The Inspector shall be one of the following:

1. An authorized full-time technical employee of the manufacturer.
2. An independent party certified as a waterproofing inspector acceptable to Architect, retained by the Contractor.

D. Testing Agency Qualifications: Qualified independent agency experienced in the installation of the specified waterproofing system, and qualified to perform observation and inspection specified in Field Quality Control Article to determine Installer’s compliance with the requirements of this Project, acceptable to Architect, retained by the Contractor.

E. Mockups: Provide waterproofing mockup application within mockups required in other sections, or if not specified, in an area of not less than 150 sq. ft. of surface where directed by Architect for each type of substrate condition. Include examples of surface preparation, crack and joint treatment, waterproofing application, and flashing, transition, and termination conditions, to set quality standards for execution.

1. Include intersection of deck waterproofing with adjacent vertical waterproofing and moisture control systems, including Air Barrier Membrane(s)

1.10 DELIVERY, STORAGE AND HANDLING

A. Accept materials on site in manufacturer's unopened original packaging.

B. Store products in weather protected environment, clear of ground and moisture, within temperature ranges recommended by waterproofing manufacturer.

C. Construction Waste: Store and dispose of packaging materials and construction waste in accordance with requirements of Section 01 74 19, "Construction Waste Management and Disposal."

1.11 ENVIRONMENTAL REQUIREMENTS

A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by air-barrier manufacturer.

1. Protect substrates from environmental conditions that affect air-barrier performance.
2. Do not apply waterproofing to a damp or wet substrate or during snow, rain, fog, or mist.

1.12 SCHEDULING

A. Coordinate installation of waterproofing with completion of air barrier installation, coatings, roofing and other work requiring interface with waterproofing.

B. Schedule work so waterproofing applications may be inspected prior to concealment.

C. Ensure waterproofing materials are cured before covering with other materials.

1.13 WARRANTY

A. Special Manufacturer's Warranty: Manufacturer's standard form in which waterproofing manufacturer agrees to furnish and install waterproofing material to repair or replace those materials installed according to manufacturer's written instructions that exhibit material defects or otherwise fail to perform as specified under normal use within warranty period specified.

1. Access for Repair: Owner shall provide unimpeded access to the Project and the waterproofing system for purposes of testing, leak investigation, and repair, and shall reinstall removed cladding and overburden materials upon completion of repair.
2. Cost Limitation: Manufacturer's obligation for repair or replacement shall be limited to the original installed cost of the work.
3. Warranty Period: 20 years date of Substantial Completion.

B. Special warranties specified in this article exclude deterioration or failure of waterproofing materials from the following:

1. Movement of the structure caused by structural settlement or stresses on the waterproofing exceeding manufacturer's written specifications for elongation.
2. Mechanical damage caused by outside agents.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Products: Provide waterproofing products manufactured by Tremco, Inc., Commercial Sealants and Waterproofing Division, An RPM Company, Beachwood OH; (866) 321-6357; email: techresources@tremcoinc.com; www.tremcosealants.com.

B. Source Limitations: Provide waterproofing system materials and accessory products from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General: Waterproofing system shall be capable of performing as a continuous watertight installation and as a moisture drainage plane transitioned to adjacent flashings and discharging water to the building exterior. Waterproofing shall accommodate normal substrate movement and seal expansion and control joints, construction material transitions, opening transitions, penetrations, and perimeter conditions without resultant moisture deterioration.

B. VOC Content: 250 g/L maximum per 40 CFR 59, Subpart D (EPA Method 24) and complying with requirements of authorities having jurisdiction.

C. Compatibility: Provide waterproofing system materials that are compatible with one another and with adjacent materials under conditions of service and application required, as demonstrated by waterproofing manufacturer based on testing and field experience.

2.3 WATERPROOFING MEMBRANE SYSTEM

A. Cold Fluid-Applied Dual Waterproofing System.

1. Basis of Design Product: Tremco, Inc., TREMproof Platinum Waterproofing System

a. Waterproofing membrane
b. Accessory Materials
c. Protective Waterproofing Course
d. Drainage

2.4 WATERPROOFING MEMBRANE

1. Waterproofing Membrane:

    a. Basis of Design Product: Tremco, Inc., TREMproof 250GC
    b. VOC Content: Less than 100 g/L, roller and self-leveling grades.
    c. VOC Content: Less than 160 g/L, trowel detailing grade.
    d. Hardness, ASTM D 2240: 80 - 90.
    e. Low Temperature Flexibility and Crack Bridging, ASTM C 1305: Pass.
    f. Adhesion in Peel, ASTM C 794: 26 lbf/in.

2.5 ACCESSORY MATERIALS

A. General: Accessory materials as described in manufacturer's written installation instructions, recommended to produce complete waterproofing system meeting performance requirements, and compatible with waterproofing material and adjacent materials.

B. Substrate Patching Material: Waterproofing manufacturer's standard trowel-grade filler material.

1. Basis of Design Product: Tremco, Inc., TREMproof 250GC T

C. Primer: Tremco approved primer meeting VOC limitations and recommended for substrate by waterproofing manufacturer.

1. Basis of Design Product: Tremco, Inc., Vulkem 191 QD.

D. Elastomeric Detail Sheet: Blended thermoset elastomeric sheet reinforced with polyester woven scrim.

1. Basis of Design Product: Tremco, Inc., TREMproof TRA Sheeting.

E. Metal Termination Bars: Waterproofing manufacturer's standard aluminum or stainless steel termination bar, with stainless steel fasteners.

F. Joint Sealant: ASTM C 920, single-component urethane, approved by waterproofing manufacturer for adhesion and compatibility with waterproofing and accessories.

1. Basis of Design Product: Tremco, Inc., Dymonic 100.

G. Polyurethane methyl methacrylate flashing system: Seamless, high-solids-content, cold liquid-applied, elastomeric, flashing system.

1. Basis of Design Products: Tremco, Inc., TREMproof PUMA.

2.6 PROTECTION COURSE

A. Protective Waterproofing Course: Waterproofing manufacturer's standard protection course material recommended for application.

1. Basis of Design Product: Tremco, Inc., TREMproof TRA Sheeting.

B. Protection Course: Waterproofing manufacturer's standard protection course material recommended for application.

1. For vertical applications:

a. Basis of Design Product: Tremco, Inc., TREMproof TRA Sheeting

2. For horizontal slab applications:

a. Basis of Design Product: Tremco, Inc., Tremco 2450 Protection Board, or 6 mil polyethylene

2.7 DRAINAGE PANELS

A. Drainage Mat: Composite mat with drainage core, filter fabric, and protective polymeric film, recommended by waterproofing manufacturer for application.

1. Basis of Desing Product: Tremco, Inc., TREMDrain Series Drainage Mats.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Surface Condition: Before applying waterproofing materials, examine substrate and conditions to ensure substrates are fully cured, smooth, clean, dry, and free from high spots, depressions, loose and foreign particles and other deterrents to adhesion, and conditions comply with manufacturer's written recommendations.

1. Verify concrete and masonry surfaces are visibly dry, have cured for time period recommended by waterproofing manufacturer, and are free from release agents, curing agents, laitance, and other contaminates. Test for waterproofing adhesion per manufacturer's recommended method. Notify Architect of unsatisfactory conditions.
2. Test for capillary moisture per manufacturer’s recommended method.
3. Verify masonry joints are filled with mortar and struck flush.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INTERFACE WITH OTHER WORK

A. Sequencing of Work: Coordinate sequencing of waterproofing work with work of other sections that form portions of building envelope moisture control to ensure that flashings and transition materials can be properly installed and inspected.

B. Subsequent Work: Coordinate waterproofing work with work of other sections installed subsequent to waterproofing to ensure complete inspection of installed waterproofing and sealing of waterproofing penetrations necessitated by subsequent work.

3.3 PREPARATION

A. Clean, prepare, and treat substrates in accordance with waterproofing manufacturer's written instructions.

1. Mask adjacent finished surfaces.
2. Remove contaminants and film-forming coatings from substrates.
3. Remove projections and excess materials and fill voids with substrate patching material.
4. Prepare and treat joints and cracks in substrate per ASTM D 4258 and waterproofing manufacturer's written instructions.

B. Detail Preparation: Prepare non-moving shrinkage cracks, large cracks, construction joints, expansion joints, projections and protrusions, penetrations, drains, and changes in plane in accordance with waterproofing manufacturer's written instructions and details, using accessory materials specified.

1. Adhere strips of elastomeric sheet to moving joints and large cracks by embedding in a layer of cold fluid-applied waterproofing and overlay with coat of cold fluid-applied waterproofing.

C. Transitions to Adjacent Materials: Install elastomeric and composite reinforced flashing to form connect and seal waterproofing material to adjacent components of building waterproofing system, including, but not limited to, roofing system waterproofing, exterior fenestration systems, door framing, and other openings

1. Seal top of through-wall flashings to waterproofing with continuous transition strips of type recommended by waterproofing manufacturer for application.
2. Install elastomeric sheets at terminations of waterproofing membrane according to manufacturer's written instructions.
3. Install termination bars and mechanically fasten to top of elastomeric flashing sheet at terminations and perimeter of waterproofing.

3.4 WATERPROOFING INSTALLATION

A. General: Apply dual waterproofing system with detailing sealants, waterproofing membrane, primer, protective waterproofing course and drainage according to manufacturer's written instructions. Apply waterproofing material within manufacturer's recommended application temperature ranges.

B. Start application with manufacturer's authorized representative present.

C. Cold Fluid-Applied Platinum WaterproofingSystem, for installation specifics please refer to the TREMproof Platinum Waterproofing System Application Instructions.

1. Apply TREMproof 250GC using roller or squeegee as a single lift of 90 mils and allow to cure.
2. Prime all existing TREMproof 250GC with Vulkem 191QD Primer Allow to dry to a tacky non-transferrable flim.
3. Install an additional 30 wet mil lift of TREMproof 250GC membrane.
4. Embed TREMproof TRA Sheeting into the wet membrane immediately.

D. Terminations: Install terminations of waterproofing membrane in accordance with ASTM C 898 and ASTM C 1471, as applicable to application, at not less than minimum height recommended by waterproofing manufacturer. Overlap waterproofing on to intersecting construction a minimum of 24 inches.

E. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates and reapply waterproofing components.

3.5 PUMA FLASHING INSTALLATION

A. General: Apply flashing material within manufacturer's recommended application temperature ranges. Flashing, including, but not limited to penetrations, drains, changes of plane shall be installed in the presence of, reviewed, as well as approved by the Architect's Inspector prior to the field application of TREMproof 6100.

B. Primer: Apply primer to substrates at required rate, using roller or brush. Allow to dry. Reprime areas if required by manufacturer's written instructions.

C. Penetrations: For penetrations, apply Tremco PUMA Primer over the cant, up the penetration to 1" below the top of the projected overburden. Allow primer to cure. Apply the Tremco PUMA BCR mixture using a medium-nap roller to achieve a minimum thickness of 60 mils over the primed penetration, over the cant, and extended minimum of 12 inches onto the horizontal plane. Spiked rollers are not required for change in plane.

3.6 PROTECTION INSTALLATION

A. Protection Course: Cover waterproofing with protection course following the written instructions prior to backfilling or subjecting installation to traffic. Overlap protection course joints.

B. Drainage Panel: Place and secure drainage panels using methods that do not penetrate waterproofing. Face geotextile away from deck substrate. Lap edges and ends of geotextile.

3.7 FIELD QUALITY CONTROL

A. Contractor's Inspector: Contractor shall engage manufacturer's qualified Inspector full-time during the Work to perform tests and inspections, including documenting of waterproofing prior to concealment.

1. Contractor's Inspector shall measure membrane thickness with pin tester at least once for every 100 sq. ft.
2. Provide written report of tests and inspections.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

C. Testing Agency: Engage a qualified testing agency to inspect substrate conditions, surface preparation, waterproofing application, protection, and drainage components, and to furnish reports to Architect.

1. Testing includes EFVM inspection prior to concealing deck waterproof membrane.

D. Coordination of Inspection: Cooperate with testing agency. Allow access to work areas and staging. Notify testing agency in writing of schedule for Work of this Section to allow sufficient time for testing and inspection.

1. Do not cover Work until testing and inspection is completed and accepted.

E. Reporting: Forward written inspection reports to the Architect within 10 working days of the inspection and test being performed.

F. Correction of Work: Correct deficient applications not passing tests and inspections, make necessary repairs, and retest as required to demonstrate compliance with requirements.

3.8 CLEANING AND PROTECTING

A. Clean spills, stains, and overspray resulting application utilizing cleaning agents recommended by manufacturers of affected construction. Remove masking materials.

B. Protect waterproofing from damage from subsequent work. Protect waterproofing materials from exposure to UV light for period in excess of that acceptable to waterproofing manufacturer; replace overexposed materials and retest.

END OF SECTION 07 14 16

SECTION 07 16 16

CRYSTALLINE WATERPROOFING

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Addition of crystalline waterproofing material to concrete mix at batch plant for use at concrete retaining walls and where otherwise indicated in the Drawings.

B. Related Requirements:

1. Section 03 30 00, "Cast-in-Place Concrete."

1.3 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

1.4 SUBMITTALS

A. Product Data: Submit copies of product data sheets for all materials supplied under this Section. Include material safety data sheets and manufacturer's installation instructions.

B. Certificates: Provide applicator certificates demonstrating manufacturer approval, training, or experience.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Installer of additive shall be approved by the manufacturer in writing.

B. Mock-ups:

1. Any concrete field samples or mock-ups for architect’s review shall include admix;

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer’s instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Xypex Chemical Corporation, 13731 Mayfield Place, Richmond, BC, Canada V6V 2G9; (800) 961-4477 www.xypex.com.

B. Pre-approved equal.

2.2 MATERIALS

A. Xypex Admix C-500 or C-1000, as determined by the concrete mix design, added to mix at batch plant at 2% to 3% by weight of Portland cement content or as recommended by the manufacturer based on the mix design.

B. Pre-approved equal.

PART 3 - EXECUTION

3.1 APPLICATION

A. Crystalline waterproofing admixture shall be added to the concrete mix at time of batching. The admixture shall be thoroughly incorporated and dispersed within the concrete mix.

B. Comply with the manufacturer’s instructions for batch mixing.

END OF SECTION 07 16 16

SECTION 07 21 00

THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Glass fiber blanket insulation.
2. Spray polyurethane foam insulation.

B. Related Requirements:

1. Section 06 10 00, "Rough Carpentry."

1.3 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect foam-plastic board insulation as follows:

1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site before installation time.

3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 - PRODUCTS

2.1 GLASS-FIBER BLANKET

A. Un-faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics. See details for types and locations.

1. Owens Corning: EcoTouch.

a. Unfaced, 3-1/2" thick, R-15.
b. Unfaced, 5-1/2" thick, R-21.

2. Accesories:

a. Owens Corning Raft-R-Mate Attic Baffle/Air Stop with insulation block at lower attic vents.

B. Glass-Fiber Blanket Accessories: high-tensile spring wire batt supports, with overall length 1/2-inch less than center-to-center joist spacing.

1. Installation: Start 4-inches from end and space 12-16-inches apart.

2.2 SOUND ATTENUATION BATTS

A. Sound Attenuation Batt Insulation: with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics. See details for types and locations.

1. Owens Corning: PINK Next Gen Fiberglas Sound Attenuation Batts (SAB) Insulation.

a. Unfaced, 3-1/2" thick.

2.3 SPRAY POLYURETHANE FOAM INSULATION

A. Closed-Cell Polyurethane Foam Insulation: ASTM C 1029, Type II, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

1. Product Requirements:

a. Minimum density of 2.0 lb/cu. ft. (medium density), thermal resistivity of 6.2 deg F x h x sq. ft./Btu x in. at 75 deg F (43 K x m/W at 24 deg C).
b. Insulation shall be listed in State of California Department of Consumer Affairs ‘Directory of Certified Insulation Materials’ as acting as a Vapor Retarder.

2. Product Manufacturer:

   a. Johns Manville: JM Corbond III.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation or vapor retarders, including removing projections capable of puncturing vapor retarders, or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.3 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Spray-Applied Insulation: Apply spray-applied insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked. After insulation is applied, make flush with face of studs by using method recommended by insulation manufacturer.

C. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

D. Loose-Fill Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft. (40 kg/cu. m).

E. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.4 PROTECTION

A. Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 07 21 00

SECTION 07 25 00

WEATHER BARRIERS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. The General Conditions, Supplementary Conditions, Instructions to Bidders, and Division 01-General Requirements shall be read in conjunction with and govern this Section.

B. Read this Specification as a whole by all parties concerned. Each Section may contain more or less than the complete Work of any trade. The Contractor is solely responsible to make clear to the installing Subcontractor the extent of their Work.

1.2 SUMMARY

A. This Section includes requirements for supplying labor, materials, tools, and equipment to complete the Work as shown on the Drawings Architectural Division as specified herein including, but not limited to, the following:

1. Adhesive/Primer
2. Self-Adhered Water Resistive Air Barrier
3. Air Barrier/Thru-wall Flashing
4. Sealant

B. RELATED REQUIREMENTS

1. See Structural Drawings for sheathing requirements.
2. Section 07 62 00, "Sheet Metal Flashing and Trim."
3. Section 07 92 00, "Joint Sealants."
4. Section 09 24 00, "Cement Plastering."

1.3 REFERENCES

A. American Architectural Manufacturers Association (AAMA):

1. AAMA 711-13 - Voluntary Specification for Self-Adhering Flashing Used for Installation of Exterior Wall Fenestration Products
2. AAMA 2400-02 - Standard Practice for Installation of Windows with a Mounting Flange in Stud Frame Construction

B. American Society for Testing and Materials (ASTM):

1. ASTM D882 - Standard Test Method for Tensile Properties of Thin Plastic Sheeting
2. ASTM D903 - Standard Test Method for Peel or Stripping Strength of Adhesive Bonds
3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
4. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials

5. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across the Specimen
6. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls by Uniform Static Air Pressure Difference
7. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
8. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials
9. ASTM E2357 - Standard Test Method for Determining Air Leakage of Air Barrier Assemblies

C. National Fire and Protection Agency (NFPA):

1. NFPA 285 - Standard Fire Test Method for Evaluation Of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components

D. US Green Building Council (USGBC), Leadership in Energy and Environmental Design (LEED)

1.4 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation meetings:

1. When required, and with prior notice, an Air Barrier Manufacturer representative will meet with the necessary parties at the jobsite to review and discuss project conditions as it relates to the integrity of the assembly.

1.5 SUBMITTALS

A. Provide the following requested information in accordance with Section [project specific] Submittal Procedures.

B. Action Submittals:

1. Product Data:

a. Air Barrier Manufacturer’s guide specification
b. Air Barrier Manufacturer’s complete set of technical data sheets for assembly
c. Air Barrier Manufacturer’s complete set of guide details for assembly

2. Certificates:

a. Product certification confirming assembly components are supplied and warranted by a single source Air Barrier Manufacturer
b. LEED HPD declaration

3. Tests and Evaluation Reports:

a. NFPA 285 wall assembly compliance:

1) Air Barrier Manufacturer statement that anticipated wall assembly complies with NFPA 285

4. Warranty:

    a. Sample warranty as specified

1.6 QUALITY ASSURANCE

A. Single Source Responsibility:

1. Obtain air barrier and auxiliary materials including adhesive/primer, air barrier, flashings, and sealants from a single Air Barrier Manufacturer regularly engaged in the manufacturing and supply of the specified products.
2. Verify product compliance with federal, state, and local regulations.

B. Manufacturer Qualifications:

1. Air Barrier Manufacturer shall demonstrate qualifications to supply materials of this Section by certifying the following:

    a. Air Barrier Manufacturer must not issue warranties for terms longer than they have been manufacturing and supplying specified products for similar scope of Work.

C. Installer Qualifications:

1. Perform Work in accordance with the Air Barrier Manufacturer's published literature and as specified in this Section.
2. Maintain one (1) copy of the Air Barrier Manufacturer's installation instructions on site.
3. At all times during the execution of the Work allow access to site by the Air Barrier Manufacturer representative.
4. If meeting with the Air Barrier Manufacturer during project construction, contact the Air Barrier Manufacturer a minimum of two weeks prior to schedule meeting.

1.7 MOCK-UPS

A. Mock-ups: Construct mock-ups to verify selections made under submittals and to set quality standards for materials and execution in accordance with Section [project specific] for mock-ups and as follows:

1. Where directed by [engineer] [architect] [consultant], construct typical exterior wall section, six and one-half (6.5) feet by six and one-half (6.5) feet, incorporating [project specific], substrate materials, and adjacent materials including flashing, door frame, window frame, attachment of insulation and [project specific]; showing air barrier application details.

B. Notify [engineer] [architect] [consultant] a minimum seven (7) days prior to mock-up construction.

C. Review and acceptance of mock-ups does not constitute approval of deviations from the Contract Documents contained in mock-ups unless [engineer] [architect] [consultant] specifically notes such deviations in writing.

D. Once reviewed by [engineer] [architect] [consultant], acceptable mock-up can form a permanent part of the Work, and will form the basis for acceptance for the remainder of the project.

E. Remove and replace materials found unacceptable at no additional cost to Owner.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Delivery of Materials:

1. Deliver materials to the jobsite in undamaged and clearly marked containers indicating the name of the Air Barrier Manufacturer and product.

B. Storage of Materials:

1. Store materials as recommended by the Air Barrier Manufacturer and conform to applicable safety regulatory agencies. Refer to all applicable data including, but not limited to, Safety Data Sheet (SDS), Technical Data sheet (TDS), product labels, and specific instructions for personal protection.
2. Keep solvents away from open flame or excessive heat.
3. Store materials in original packaging.
4. Protect rolls from direct sunlight until ready for use.
5. Refer to Air Barrier Manufacturer’s product TDS.

C. Handling:

1. Refer to Air Barrier Manufacturer’s product TDS.

1.9 SITE CONDITIONS

A. Environmental Requirements:

1. Do not perform Work during rain or inclement weather.
2. Do not perform Work on frost covered substrates or surfaces that are wet to touch.

B. Protection:

1. It is the responsibility of the installing Subcontractor to protect all surfaces not included in scope of Work from overspray including, but not limited to, windows, doors, adjacent areas, and vehicles.
2. Cap and protect exposed back-up walls against wet weather conditions during and after application of air barrier assembly.

C. Complete preparation Work prior to installing air barrier.

D. Ground all equipment during operations.

1.10 WARRANTY

A. Manufacturer's Single Source Warranty; choose from the following:

1. Product Warranty:

a. Manufacturer must warrant the material against product defect for a period of one (1) year from date of purchase.

2. Assembly Warranty:

a. Manufacturer must warrant the assembly against product defect for a period of twelve (12) years from the date of substantial completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Air Barrier and auxiliary materials shall comply with the following system requirements:

1. Obtain air barrier and auxiliary materials as a single-source from the Air Barrier Manufacturer to ensure total system compatibility and integrity.
2. Air leakage:

a. ASTM E2357: Pass
b. CAN/ULC-S742-11: Classification A1
c. CAN/ULC S741-08

3. Water resistance:

a. AATCC TM127: Pass
b. ASTM E331: Pass

4. Nail Sealability:

a. AAMA 711-13, ASTM D1970: Pass

B. Acceptable Manufacturers:

1. Henry Company, 999 N. Sepulveda Blvd. Suite 800, El Segundo, CA 90245; 800-486-1278; www.henry.com.

2.2 MATERIALS

A. Primary Sheet-Applied, Vapor Permeable Water Resistive Air Barrier (Basis of Design):

1. Self-adhered vapor permeable, water resistive air barrier consisting of a reinforced, modified polyolefin tri-laminate film surface and patented permeable adhesive technology with split-back poly-release film; having the following typical physical properties:

a. Basis of design: Henry Blueskin VP160 Self-Adhered Water Resistive Air Barrier
b. Color: Blue
c. Thickness: 23 mils (0.58 mm)
d. Water Vapor Permeance (ASTM E96): 29 perms
e. Air Leakage of Air Barrier Assemblies (ASTM E2357): Pass
f. Air Permeance (ASTM E2178): Pass
g. Nail Sealability (ASTM D1970): Pass
h. Dry Tensile Strength (ASTM D882):

1) 41 lbf /182N MD
2) 29 lbf /129N CD

i. Surface Burning Characteristics (ASTM E84):

1) Flame Spread: Class A
2) Smoke Development: Class A

j. Low Application Temperature: 20 degrees F (-7 degrees C)

B. Secondary Grade D building paper:

1. Two-ply asphalt saturated kraft Grade D building paper.

a. Basis of design: Henry – Two-Ply Super Jumbo Tex 60 Minute.
b. Reference Standard: ASTM E2556, Type II.
c. Moisture Vapor Transmission: 10 perms minimum; ASTM E96.
d. Water Resistance: 150 minutes (professional), ASTM D779.
e. Accessories:

1) Weather-Resistive Barrier Seam Tape: pressure sensitive tape as recommended by membrane manufacturer.

a) Adhesive Type: Acrylic.

2) Sealant: One component, moisture curing, non-sag, gun-grade elastomeric polymer for use as a sealant or liquid applied flashing.

a) Sealant Basis of Design: Henry – Moistop Sealant.
b) Referenced Standards: Must meet AAMA 808.3 and ASTM C920.
c) Movement Capability: ±25%; ASTM C719.
d) Max VOC: 9 g/L; ASTM D3960.
e) Compatibility: Chemically compatible with flexible flashing; AAMA 713.

C. Rainscreen Drainage Mat:

1. Polypropylene core mesh laminated to non-woven filter fabric.
2. Basis of design: Rainscreen: Henry - WeatherSmart Rainscreen.

a. Reference Standard: ASTM E2925.
b. Flamespread: Class A; ASTM E84.
c. Drainage Efficiency: >94%; ASTM E2925.
d. Thickness: 6 mm minimum.

D. Assembly Auxiliary Materials:

1. Adhesives/Primers:

a. Low VOC adhesive:

1) Polymer emulsion water based quick setting adhesive with low VOC content; having the following typical physical properties:

a) Basis of design: Henry® Aquatac™ Primer
b) Color: Aqua
c) Maximum VOC: 50 g/L
d) Drying time (initial set): 30 minutes

e) Low Application Temperature: 25 degrees F (-4 degrees C)

2. Self-Adhered Flashing:

a. Vapor Permeable Flashing:

1) Self-adhered water resistive vapor permeable air barrier consisting of a reinforced modified polyolefin tri-laminate film surface and patented adhesive technology with split-back poly-release film; having the following typical physical properties:

a) Basis of design: Henry Blueskin VP160 Self-Adhered Water Resistive Air Barrier
b) Color: Blue
c) Thickness: 23 mils (0.58 mm)
d) Water Vapor Permeance (ASTM E96): 29 perms
e) Nail Sealability (ASTM D1970): Pass
f) Low Application Temperature: 20 degrees F (-7 degrees C)

3. Sealants:

a. Building Envelope Sealant:

1) Moisture cure, medium modulus polymer modified sealing compound; having the following typical physical properties:

a) Basis of design: Henry 925 BES Sealant
b) Color: Varies
c) Elongation: 450 – 550%.

b. Termination Sealant:

1) One-part high performance synthetic rubber sealant; having the following typical physical properties:

a) Basis of design: Henry 212 All Purpose Crystal Clear Sealant
b) Color: Clear
c) Elongation: 200% minimum

E. Additional Materials:

1. Thru-Wall Flashing:

a. Non-vapor permeable self-adhered through-wall flashing consisting of an SBS rubberized asphalt compound integrally laminated to a yellow engineered thermoplastic film surface; having the following typical physical properties:

1) Basis of design: Henry Blueskin TWF Thru-Wall Flashing
2) Color: Yellow
3) Thickness: 40 mils (1.0 mm)
4) Water Vapor Permeance (ASTM E96): 0. 03 perms
5) High Temperature Stability - Flow Resistance (ASTM D5147): Pass
6) Low Application Temperature: 40 degrees F (4 degrees C)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:

1. Verify substrates to receive Work and surrounding adjacent surfaces are in accordance with Air Barrier Manufacturer's installation guide and as specified in this Section prior to installation of self-adhered air barrier assembly.
2. Continuous substrate:

    a. Existing substrate must be continuous and secured prior to application of air barrier.
    b. Securely fasten sheathing panels and install flush to ensure a continuous substrate in accordance with Air Barrier Manufacturer's installation guide and as specified in this Section.
    c. Fastener penetrations must be set flush with sheathing and fastened into solid backing.
    d. Refer to Air Barrier Manufacturer's details.

3. Strike masonry joints flush.
4. Concrete surfaces shall be smooth and without large voids, spalled areas or sharp protrusions. Refer to Air Barrier Manufacturer's details for substrate gap limitations.
5. Remove concrete forms and allow new concrete to cure for a minimum of fourteen (14) days.
6. Curing compounds or release agents used in concrete construction must be resin based without oil, wax or pigments.
7. Do not install air barrier over substrates that are wet to touch.

B. Notify Contractor in writing of any conditions that are not acceptable.

C. The installing contractor shall examine and determine that surfaces and conditions are ready to accept the Work of this Section in accordance with the Air Barrier Manufacturer's installation guide and as specified in this Section. Commencement of Work or any parts thereof shall mean installer's acceptance of the substrate.

D. Do not apply air barrier until substrate and environmental conditions are in accordance with Air Barrier Manufacturer's installation guide and as specified in this Section.

3.2 PREPARATION

A. All surfaces must be sound, dry, clean, and free of oil, grease, dirt, excess mortar, frost, laitance, loose and flaking particles, or other contaminants.

B. Protect adjacent surfaces not included in scope of Work to prevent spillage and overspray.

C. Cap and protect exposed back-up walls against wet weather conditions during and after application of the air barrier assembly.

3.3 INSTALLATION

A. Ensure substrate is ready to receive air barrier in accordance with Air Barrier Manufacturer's installation guide and as specified in this Section.

B. Temperature limitation:

1. Primary air barrier:

a. Substrate temperature must be above 20 degrees F (-7 degrees C) and rising.

2. Auxiliary products:

a. Temperature limitations may vary. Refer to Air Barrier Manufacturer's product TDS for product specific temperature limitations.

C. Application of flashing:

1. Self-adhered flashing:

a. Where required install adhesive/primer recommended by Air Barrier Manufacturer continuously at rate recommended ensuring complete substrate coverage of anticipated flashing installation area.

1) Allow adhesive/primer to cure to a tacky film prior to application of flashing.
2) Primed areas not covered by end of day must be re-primed prior to installation of flashing.

b. Measure and cut self-adhered flashing to ensure adequate length to achieve continuous coverage of desired installation.
c. Peel protective film from self-adhered flashing and align top of membrane verifying proper positioning prior to complete film removal and flashing placement.
d. Press self-adhered flashing firmly into place by applying hand pressure to the middle of the membrane and working the pressure to the edges; eliminating wrinkles and air bubbles.
e. Install self-adhered flashings in shingle fashion to eliminate reverse laps.
f. Where required, prime laps at rate recommended by Air Barrier Manufacturer to ensure complete coverage of anticipated lap installation.
g. Lap adjoining edges a minimum of two (2) inches.
h. Roll flashing and laps with countertop roller to obtain thorough adhesion.
i. Seal reverse laps at self-adhered flashing with sealant. Sealant recommendations may vary due to product or sequence of construction. Refer to Air Barrier Manufacturer details for recommended sealant.

D. Detailing/Flashing:

1. Complete detailing and flashing installations per Air Barrier Manufacturer's installation guide, details, and this specification.
2. Refer to Air Barrier Manufacturer details for further clarification and installation procedures including, but not limited to, the following:

a. Inside corners
b. Outside corners
c. Pipe penetrations
d. Shelf angles

e. Wall to foundation transitions
f. Reverse laps
g. Construction joints
h. Rough openings:

1) Install rough opening details per Window Manufacturer's installation guide details and in accordance with ASTM E2112.
2) Wall assemblies containing a vapor retarder on the interior wall assembly:

a) Extend flashing into rough opening to ensure sufficient membrane for connection with vapor retarder and provide a continuous air barrier assembly.

3. Transitions:

a. Contact Air Barrier Manufacturer to coordinate transition of self-adhered air barrier to adjacent areas including, but not limited to, the following:

1) Roof to air barrier
2) Air barrier to vertical or horizontal waterproofing
3) Fastener penetrations

E. Application of Primary Sheet-Applied Vapor Permeable Water Resistive Air Barrier:

1. Where required, install adhesive/primer recommended by Air Barrier Manufacturer continuously and at rate recommended by Air Barrier Manufacturer to ensure complete substrate coverage of anticipated flashing installation area.

a. Allow adhesive/primer to cure to a tacky film prior to application of air barrier.
b. Primed areas not covered by end of day must be re-primed prior to installation of air barrier.

2. Peel protective film from primary air barrier and align top of verifying proper positioning prior to complete film removal and placement.
3. Press primary air barrier firmly into place by applying hand pressure to the middle of the membrane and working the pressure to the edges; eliminating wrinkles and air bubbles.
4. Install primary air barrier in shingle fashion to eliminate reverse laps.
5. For lap adhesion enhancements, install standard or low VOC adhesive continuously and at rate recommended by Air Barrier Manufacturer to ensure substrate coverage of anticipated flashing installation area.

a. Allow adhesive/primer to cure to a tacky film prior to subsequent primary air barrier installation.

6. Horizontal applications:

a. Horizontal seams: two (2) inch minimum.
b. Vertical seams: three (3) inch minimum.

7. Roll primary air barrier and laps with countertop roller to obtain thorough adhesion.
8. Seal permanent reverse laps of primary air barrier with termination sealant.

F. Special Considerations:

1. Contact Air Barrier Manufacturer to verify product and installation requirements.

2. Wall assemblies identified as special conditions and requiring supplemental detailing may include, but are not limited to, any of the following:

    a. Panelized wall assemblies.
    b. Sloped wall assemblies.
    c. Rainscreen cladding systems permitting permanent direct exposure to bulk water onto the primary air barrier within a completed wall assembly.
    d. Claddings impeding drainage and/or promoting hydrostatic pressure:

        1) Horizontal Z-girts or furring strips installed directly onto air barrier in a manner to encourage water collection.

G. Fastener Penetrations Through Primary Air Barrier:

1. It is the responsibility of the installer penetrating the air barrier assembly to install fasteners and components in accordance with the Air Barrier Manufacturer's installation guide and as specified in this Section.
2. Installation requirements:

    a. Drill fasteners and components with sufficient compression to maintain continuity in the air barrier assembly.
    b. Refer to "Self-tapping fasteners" and/or "Pre-drilled fasteners".

3. Supplemental sealant:

    a. Penetrations that do not meet installation requirements require the addition of termination sealant at point of insertion through the air barrier to maintain continuity in the air barrier assembly.

4. Self-tapping fasteners:

    a. Fastener head/assembly component must be larger in diameter than the fastener shank.
    b. Install fastener head/assembly component to provide a continuous compression firmly against the air barrier creating a gasketing seal without damaging the membrane.
    c. Do not install fastener components through the air barrier over unsupported areas of the substrate such as sheathing joints.
    d. Remove overdriven fasteners, improperly installed fasteners, defective/broken fasteners, or fasteners not properly fastened into the building structure beyond the air barrier membrane and seal the vacated hole with termination sealant prior to the installation of the exterior cladding.

5. Pre-drilled fastening assemblies:

    a. Fastening head/assembly component must be larger in diameter than predrilled hole.
    b. Install fastening head/assembly component to provide a continuous compression firmly against the air barrier creating a gasketing seal without damaging the membrane.
    c. Do not install fastening components through air barrier over unsupported areas of the substrate such as sheathing joints.
    d. Seal improperly drilled and/or vacated holes with termination sealant prior to the installation of the exterior cladding.

H. Application of Rainscreen Drainage Mat:

1. Ensure items which pass through membrane are properly and rigidly installed, substrate is free of projections and irregularities which may be detrimental to proper installation of Drainage Mat.
2. Apply Drainage Mat in accordance with manufacturer's recommendations, laid smooth without folds or bunches of material.
3. Seam Overlap: As recommended by Drainage Mat manufacturer for specific Drainage Mat material and application indicated.
4. Sealing: Use Henry Sheathing Tape to secure any seams not lapped with Drainage Mat when used with cement plaster.
5. Inspect and repair Drainage Mat prior to application of finish material over Drainage Mat. Tape tears, perforations and similar damage.

3.4 FIELD QUALITY CONTROL

A. Final Observation and Verification:

1. Owner's representative, General Contractor, or Air Barrier Manufacturer shall complete the final inspection of the air barrier assembly as required by warranty.

a. Contact Air Barrier Manufacturer for warranty issuance requirements.

B. Install cladding as soon as practical after application. Air barrier assembly not designed for permanent UV exposure. Refer to Air Barrier Manufacturer's product TDS for product limitations.

3.5 CLEANING

A. As the Work proceeds, and upon completion, promptly clean up and remove from the premises all rubbish and surplus materials resulting from the foregoing Work.

B. Clean soiled surfaces, spatters, and damage caused by Work of this Section.

C. Check area to ensure cleanliness and remove debris, equipment, and excess material from the site.

END OF SECTION 07 25 00

SECTION 07 26 16

UNDER-SLAB VAPOR BARRIER

PART 1 - GENERAL

1.1 SUMMARY

A. Products supplied under this section:

1. Vapor barrier, seam tape, and mastic for installation under concrete slabs.

B. Related Requirements:

1. Section 03 30 00, “Cast-in-Place Concrete.”

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM E1745- 11Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
2. ASTM E1643- 11Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

B. American Concrete Institute (ACI):

1. ACI 302.2R-06 Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.
2. ACI 302.1R-15 Guide to Concrete Floor and Slab Construction.

1.3 SUBMITTALS

A. Quality control/assurance:

1. Summary of test results per paragraph 9.3 of ASTM E1745.
2. Manufacturer’s samples, literature.
3. Manufacturer’s installation instructions for placement, seaming, penetration prevention and repair, and perimeter seal per ASTM E1643.
4. All mandatory ASTM E1745 testing must be performed on a single production roll per ASTM E1745 Section 8.1.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Vapor barrier must have all of the following qualities:

1. Permeance of less than 0.01 Perms as tested in accordance with mandatory conditioning tests per ASTM E1745 Section 7.1 (7.1.1-7.1.5).
2. Other performance criteria:

    a. Strength: ASTM E 1745 Class A.
    b. Thickness: 15 mils minimum.

3. Provide third party documentation that all testing was performed on a single production roll per ASTM E1745 Section 8.1.

B. Vapor barrier products:

1. Basis of Design: Stego Wrap Vapor Barrier (15-mil) by Stego Industries LLC, (877) 464-7834, www.stegoindustries.com.

2.2 ACCESSORIES

A. Seam tape:

1. Stego Tape by Stego Industries LLC, (877) 464-7834; www.stegoindustries.com.

B. Sealing Penetrations of Vapor barrier:

1. Stego Mastic by Stego Industries LLC, (877) 464-7834; www.stegoindustries.com.
2. Stego Tape by Stego Industries LLC, (877) 464-7834; www.stegoindustries.com.

C. Perimeter/edge seal:

1. Stego Crete Claw by Stego Industries LLC, (877) 464-7834www.stegoindustries.com.
2. Stego Term Bar by Stego Industries LLC, (877) 464-7834; www.stegoindustries.com.
3. StegoTack Tape (double-sided sealant tape) by Stego Industries LLC, (877) 464-7834; www.stegoindustries.com.

D. Penetration Prevention:

1. Beast Foot by Stego Industries LLC, (877) 464-7834; www.stegoindustries.com.
2. Beast Form Stake by Stego Industries LLC, (877) 464-7834; www.stegoindustries.com.

E. Vapor Barrier-Safe Screed System:

1. Beast Screed by Stego Industries, LLC, (877) 464-7834 www.stegoindustries.com.

PART 3 - EXECUTION

3.1 PREPARATION

A. Ensure that base material is approved by Architect or Geotechnical Engineer.

1. Level and compact base material.

3.2 INSTALLATION

A. Install vapor barrier in accordance with manufacturer's instructions and ASTM E 1643.

1. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.
2. Extend vapor barrier to the perimeter of the slab. If practicable, terminate it at the top of the slab, otherwise (a) at a point acceptable to the structural engineer or (b) where obstructed by impediments, such as dowels, waterstops, or any other site condition requiring early termination of the vapor barrier. At the point of termination, seal vapor barrier to the foundation wall, grade beam or slab itself.
3. Perimeter Seal Options:

    a. Seal vapor barrier to the entire slab perimeter using Stego Crete Claw, per manufacturer's instructions.
    b. Seal vapor barrier to the entire perimeter wall or footing/grade beam with double sided StegoTack Tape, or both Stego Term Bar and StegoTack Tape, per manufacturer's instructions. Ensure the concrete is clean and dry prior to adhering tape.

4. Overlap joints 6 inches and seal with manufacturer's seam tape.
5. Apply seam tape/Crete Claw to a clean and dry vapor barrier.
6. Seal all penetrations (including pipes) per manufacturer's instructions.
7. For interior forming applications, avoid the use of non-permanent stakes driven through vapor barrier. Use Beast Form Stake and Beast Foot as a vapor barrier-safe forming system. Ensure Beast Foot's peel-and-stick adhesive base is fully adhered to the vapor barrier.
8. If non-permanent stakes must be driven through vapor retarder, repair as recommended by vapor retarder manufacturer.
9. Use reinforcing bar supports with base sections that eliminate or minimize the potential for puncture of the vapor barrier.
10. Repair damaged areas with vapor barrier material of similar (or better) permeance, puncture and tensile.
11. For vapor barrier-safe concrete screeding applications, install Beast Screed (vapor barrier-safe screed system) per manufacturer's instructions prior to placing concrete.

END OF SECTION 07 26 16

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SECTION 07 32 13

CLAY ROOF TILE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Barrel Tile Steep Slope Roofing: Barrel tiles over 100% butyl rubber adhesive backed high density cross laminated polyethylene film over structural plywood.
2. Metal roof flashing.
3. Related roof accessories.

B. Related Requirements:

1. Section 06 10 00, "Rough Carpentry," for roof sheathing and nailers.
2. Section 06 16 00, "Sheathing."
3. Section 07 21 00, "Insulation."
4. Section 07 62 00, "Sheet Metal Flashing and Trim."
5. Division 15 - Mechanical: Mechanical work projecting through roof.
6. Division 16: - Electrical: Electrical work projecting through roof.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

1.4 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM C 144 - Standard Specification for Aggregate for Masonry Mortar.
2. ASTM C 150 - Standard Specification for Portland Cement.
3. ASTM C 1167 - Standard Specification for Clay Roof Tiles.
4. ASTM D 226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.

5. ASTM D 1002 - Standard Test Method for Apparent Shear Strength of Single-Lap- Joint Adhesively Bonded Metal Specimens by Tension Loading.
6. ASTM D 2626 - Standard Specification for Asphalt-Saturated and Coated Organic Felt Base Sheet Used in Roofing.
7. ASTM D 2822 - Standard Specification for Asphalt Roof Cement.

B. IAPMO UES Evaluation Report 0411 – Clay Roof Tiles.

C. IAPMO UES ER-2015 – TRI Concrete and Clay Roof Tile Installation Manual

D. ICC Evaluation Service Evaluation Report – ESR-1017 Clay Roof Tile.

E. California Title 24 - California's Energy Efficiency Standards for Residential and Nonresidential Buildings.

F. TRI Cold & Snow Concrete and Clay Tile Design Criteria for Cold and Snow Regions.

G. TRI Concrete and Clay Roof Tile Installation Manual Fifth Edition

H. FRSA/TRI Florida High Wind Tile Installation Manual, Revised Fifth Edition, 2014.

1.5 DESIGN REQUIREMENTS

A. Clay Roof Tile materials and installation shall conform to the requirements of ICC- ES, ESR-1017.

B. Roofing tile materials and installation shall conform to the requirements of the applicable building code.

1.6 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

B. Shop Drawings: Indicate metal flashing profiles, joint locations, fastening locations, and installation details. Indicate tile layout with location of cut and special shaped tiles identified.

C. Selection Samples: For each finish product specified, two complete sets of tile colors representing manufacturer's full range of available colors and patterns.

D. Verification Samples: For each finish product specified, two full size samples representing actual product, color, and patterns.

E. Certificates of Compliance: Submit to certify compliance with referenced standards.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum five years documented experience producing concrete roof tile and member of Tile Roof Institute.

B. Installer Qualifications: Minimum five years documented experience installing products specified in this section and/or supervision by a manufacturers authorized installation representative.

C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

1. Finish areas designated by Architect.
2. Mock-up shall be a minimum of a 10 foot (3.05 M) by 10 foot (3.05 M) area and include the edge, ridge, valley and other typical transition conditions anticipated.
3. Do not proceed with remaining work until installation workmanship and appearance is approved by Architect.
4. Mock-up may not remain as part of Work.
5. Accepted mock-up may remain as part of Work.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging with labels intact until ready for installation.

B. Deliver products to project site in manufacturer's unopened pallets, labeled with data indicating compliance with specified requirements.

C. Maintain dry storage area for products of this section until installation of products.

1.9 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

B. Do not overload the roof. Distribute stacks of tile uniformly on roof at not greater than 12 inches (305 mm) in height.

1.10 WARRANTY

A. Roof Tile: Ludowici’s 75 year limited material warranty.

B. Underlayment: GCP Grace Ultra butyl roofing underlayment Manufacturer’s Warranty.

C. Installation Warranty: Warrants products of this section, as installed, to be in accord with the Contract Documents and free from faults and defects in materials and workmanship for a period of 3 years after completion.

1.11 EXTRA MATERIALS

A. Provide an additional 1 percent of installed roof tiles, but not less than one full square, for Owner's use in roof maintenance.

B. Furnish extra materials packaged with protective covering for storage and identified with labels clearly describing contents.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.2 Acceptable Manufacturer: Ludowici, 4757 Tile Plant Rd., P.O. Box 69, New Lexington, OH 43764; 740-342-1995; ludowici.com.

2.3 CLAY ROOF TILE

A. Clay Tile General:

1. Made with up to 59 percent recycled raw materials and are 100 percent recyclable.
2. Class A fire rated.
3. Cool Roof and Energy Star rated.
4. California Title 24 (Heat Island) Compliant without upgrades.

B. Barrel Tile Steep Slope Roofing: 2-Piece Tapered Mission Clay Roofing Tile with matching hip, ridge, rakes, boosters and birdstops:

1. Product: Cubana 18 3/8" Barrel Tile by Ludowici.
2. Size: 18 3/8 inches by 8 1/4 inches, nominal.
3. Exposure: 11 inches C.C. by 15 3/8 inches.
4. Installed weight per square: Approximately 1,200 lbs.
5. Color Blend: Vechio Blend.
6. Base Texture: Weathered texture.

2.4 ACCESSORY MATERIALS

A. Underlayment: High Performance 100% butyl rubber adhesive backed by a layer of high density cross laminated polyethylene film.

1. Material: "Grace Ultra" by GCP Applied Technologies.

a. Thickness: 30 mils.
b. Tensile Strength (ASTM D412): 250 psi.
c. Elongation (ASTM D412): 250%.
d. Permeance (ASTM E96): 0.05 Perms.
e. Material Weight installed (ASTM D461): 0.22 lb/sq.ft. max.
f. Adhesion to Plywood (ASTM D903): 3.0 lbs/in. width.

B. Battens: Pressure-treated Douglas Fir in accordance with AWPB LP-3.

1. Elevated Batten System battens 1 inch by 3 inch by 8 feet nominal.
2. Elevated Batten System battens 1 inch by 2 inch by 8 feet nominal.

3. Elevated Batten System battens 1 inch by 3 inch by 4 feet nominal.
4. Elevated Batten System battens 1 inch by 2 inch by 4 feet nominal.

C. Fasteners: Sized to penetrate deck minimum 3/4 inch or through thickness of deck or batten.

1. Quik Drive screws complying with ASTM 641, Class 1, with 2 inch or 2-1/2 inch Screws, Roofing Specific.

D. Wind Clips:

1. Zip-Clip Adjustable Tile Clip.
2. Wind Clips, Galvanized Steel
3. Wind Clips, Stainless Steel.

E. Rake and Gable End:

1. Prefabricated Rake and Ridge tile. Choose to match tile profile and color.
2. Boral Roofing: Metal Rake Trim.
3. Boral Roofing: Gable End Rubber Wedges.

F. Flashings:

1. Ribbed Valley Metal, 24 gauge G90 corrosion resistant metal flashing, painted.
2. Universal flashing for abutments at chimneys, walls and other rising structures.
3. Plumbing Stacks and Other Pipes Penetrating Roofs as recommended by the manufacturer.

G. Mortar materials, plastic cement and sealant: Code approved adhesive suitable to bond to clay roof tile.

1. Sand: ASTM C 144.
2. Portland cement: ASTM C 150, Type 1.
3. Plastic cement: ASTM D 2822.
4. Silicone sealant: ASTM D 1002.

H. Nailers:

1. 2 inch by 6 inch wood nailing strips at all hips and ridges.
2. 2 inch by 2 inch wood nailing strips at all hips and ridges fastened to Ridge Riser universal hip and ridge brackets.
3. 2 inch by 4 inch wood nailing strips under first row of cover tile after gable roll, with adjacent 2 inch by 2 inch wood nailing strip along rake sides of profiled tiles only.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Verify surfaces are uniform free of ridges, warp or voids, smooth, clean and dry

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result under the project conditions.

3.3 INSTALLATION - GENERAL

A. Install in accordance with manufacturer's instructions and the following:

1. Barrel Tile Steep Slope Roofing:

a. Ludowici Barrel Tile Installation Manual.

2. IAPMO UES Evaluation Report 0411 – Clay Roof Tiles.
3. IAPMO UES ER-2015 - TRI Concrete and Clay Roof Tile Installation Manual (TRI Installation Manual).
4. FRSA/TRI Florida High Wind Tile Installation Manual, Revised Fifth Edition, 2014

3.4 INSTALLATION:

A. Underlayment: Install in accordance with the manufacturer’s instructions.

B. Flashings: Install Ribbed Valley Metal according to Boral Roofing’s installation instructions.

1. Valleys: Install preformed metal flashing over underlayment.

a. Closed Valley: Miter tile to form straight border at center of valley.
b. Open Valley: Miter tile to form straight border a minimum of 11 inches back from the center of the valley on each side.

2. Side Wall Flashing:

a. Lap Top Flange of Base Flashing: 6 inches, minimum.
b. Nail metal near edge 6 inches on center.
c. Extend flashing under tile at least 4 inches and turn edge up 1-1/2 inches.
d. Lap Joints: 3 inches, minimum.

3. Sides of dormers, chimneys and other walls, extend flashing at least 6 inches up vertical surface.

a. Extend flashing under tile at least 4 inches and turn edge up 1-1/2 inches.
b. Lap Joints: 3 inches, minimum.

4. At wood saddles and returns, line with Wakeflex flashing extending up roof slope not less than 14 inches, and up vertical walls not less than 6 inches, and thoroughly counter flash.
5. Make all counter flashing plugged, pointed and secure.

C. Birdstops, boosters and starters for profiled tiles only:

1. Install clay birdstops along entire length of all eaves.

2. Install first course of pan tile leaving a 2 to 3 inch overhang at eave.
3. Install 3 inch booster tiles on top of birdstops.
4. Install 15 inch starter tiles on top of booster tiles along perimeter of all eaves.

D. Eave Closures:

1. Prefabricated metal eave closure; profile to match tile, fastened at minimum 18 inches on center along eave.

E. Fasteners:

1. Follow manufacturer's installation recommendations.

F. Install field tile in courses beginning at eave working up incline of roof deck.

1. Follow Ludowici Barrel Tile Installation Manual.
2. Follow TRI Installation Manual.
3. As an alternate, end caps can be embedded in cement mortar for a more rustic appearance.
4. As an alternate, cover tiles can be added using booster tiles laid dry or laid in cement mortar.
5. Install hip and ridge tiles:

    a. Provide cement mortar or other approved materials at all hips and ridges to completely fill voids and to weatherproof the roof.
    b. All hip, ridge and first row of cover tiles after gable roll shall be set in cement mortar and fastened by non-corrosive nails.

6. All tiles in contact with cement mortar shall be immersed in water for two minutes before laying.
7. To avoid color problems on roof:

    a. Load roof tiles from different pallets.
    b. Visually inspect application from the ground level after installing 100 tiles.
    c. Visually verify that roof tile color is uniform and even, and verify that tile courses are straight and true.

8. Correct any color or installation problems before proceeding with the installation.
9. Complete installation to provide weather tight service.

G. Flashing at Curb Mounted Skylights and Other Items:

1. Follow Ludowici Barrel Tile Installation Manual.
2. Follow TRI Installation Manual.

H. Flashing at Plumbing Stacks, Pipes, Turbines, Vents, Etc:

1. Follow Ludowici Barrel Tile Installation Manual.
2. Follow TRI Installation Manual.

I. Coatings: Apply color coordinated paint to all exposed metal flashings.

3.5 CLEANING

A. Remove all broken tile, debris and excess tile from roof.

B. Sweep cut tiles clean.

3.6 REPAIR AND REPLACEMENT

A. Damaged Tile:

1. Break out damaged roof tile.
2. Repair torn underlayment.
3. Drive fastener flush.
4. Apply minimum 3/8 inch by 2 inch bead of approved adhesive on tile in course below replacement tile.
5. Immediately set replacement tile in position assuring proper contact.

B. Damaged Small Valley and Hip Cuts:

1. Apply a minimum of 3/8 inch by 2 inch bead of approved adhesive at head of cut tile.
2. Immediately set tile in course above in position assuring proper contact.

3.7 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 07 32 13

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Manufactured sheet metal flashing & trim.
2. Formed roof-drainage sheet metal fabrications.
3. Formed wall sheet metal fabrications.
4. Manufactured Rain Drainage.
5. Sealant work related to sheet metal flashing and trim.
6. Requirements for miscellaneous sheet metal integral with products and systems included under other Sections.

B. Related Requirements:

1. Section 07 14 16, “Cold Fluid-Applied Waterproofing.”
2. Section 07 25 00, “Weather Barriers.”
3. Section 07 32 13, "Clay Roof Tiles."
4. Section 09 24 00, “Cement Plaster.”
5. Section 09 90 00, “Painting and Coating;” for painting of exposed sheet metal trim.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

1.4 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM International):

1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
2. ASTM D4586 - Standard Specification for Asphalt Roof Cement, Asbestos-Free.

B. Sheet Metal and Air Conditioning Contractors' National Association:

1. SMACNA (ASMM) - Architectural Sheet Metal Manual.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
2. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

B. Scheduling:

1. Insure timely delivery of items to be embedded in work of other sections and furnish setting drawings or templates and setting instructions for exact installation.

1.6 SUBMITTALS

A. Shop Drawings: Fully detailed, large-scale drawings for fabrication and installation layout of sheet metal flashing and trim including plans, elevations, and keyed details. Distinguish between shop and field-assembled work.

1. For all products, including Fry Reglet manufactured products, indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

1.7 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA Architectural Sheet Metal Manual requirements and standard details, except as otherwise indicated.

B. Fabricator and Installer Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle packaged materials in original containers with seals unbroken and labels intact until time of use.

B. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.

C. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

D. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Sheet Metal, Typical: Galvanized bonderized steel, Commercial Quality, complying with ASTM A653 and A924, bonderized, shop primed and field painted.

1. Coating Designation: G90.
2. Thickness:

a. Typical: As required by SMACNA for specific conditions; 24 gage minimum.
b. Continuous Cleats: Minimum 20 gage.

C. Copper: ASTM B370, minimum weight 16 ounces per square foot, except as otherwise indicated.

1. Thickness shall be modified by fabricator if required to avoid oil-canning at exposed locations.
2. Exposed joints shall be soldered on concealed side.
3. Finish: Chemical patina treatment, as specified.
4. Finger prints are not acceptable at exposed locations; install with cotton gloves.

D. Aluminum Sheet: ASTM B209 (ASTM B209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.

1. Factory Prime Coating: Where painting after installation is required, pretreat metal with white or light-colored, factory-applied, baked-on epoxy primer coat; minimum dry film thickness of 0.2 mil.

E. Stainless Steel Sheet: ASTM A240/A240M, Type 304 or Type 316, as indicated in the drawings, dead soft, fully annealed; with smooth, flat surface.

1. Finish: as indicated on the drawings.

2.3 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.

2. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.
3. Fasteners for Zinc Sheet: Series 300 stainless steel or hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

C. Solder:

1. For Zinc-Coated (Galvanized) Steel: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead with maximum lead content of 0.2 percent.

D. Underlayment Materials:

1. Self-Adhering, High-Temperature Sheet Underlayment: Minimum 30 mils thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal flashing. Provide primer in accordance with underlayment manufacturer's written instructions.

E. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

F. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

G. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

H. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.

I. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

J. Primer: Zinc chromate type.

K. Protective Backing Paint: Zinc molybdate alkyd.

L. Premanufacturerd Flashing Panels: Flashing panels to weatherproof plumbing and electrical penetrations in exterior walls; “Quickflash Flashing Panels” by Quickflash Weatherproofing Products, Inc., 4129 Wagon Trail Avenue, Las Vegas, NV 89118; 800-963-6886, http://www.quickflashproducts.com.

2.4 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible. Where work is not otherwise shown or noted, design and fabricate in accordance with SMACNA.

1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
2. Obtain field measurements for accurate fit before shop fabrication.
3. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

C. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

D. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.

1. Use lapped expansion joints only where indicated on Drawings.

E. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.

F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

G. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.

H. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

2.5 MANUFACTURED SHEET METAL FLASHING AND TRIM

A. Manufactured Reglets:

1. Description: Fabricate of 24 gauge galvanized sheet metal to match typical sheet metal, with manufactured 3-way intersections, and outside and inside corners.
2. Manufacturer: Fry Reglet Corp.; or equal.
3. Reglet Types: types and dimensions as indicated on Drawings.

2.6 MANUFACTURED RAIN DRAINAGE

A. General: Metal gutters, downspouts, and other components as shown on the Drawings and acceptable to Architect.

1. Downspouts, Dowspout Brackets, and Conductor Heads:

a. Classic Gutter Systems: Cast Flush Mount Downspout Bracket-'Clover', 3" Brass.
b. Classic Gutter Systems: 3" Copper Downspout, 18 Oz. Copper Welded Seam, Smooth Round.
c. Gutter Supply.com. 'Royal' Conductor Head', Copper, 3"' Outlet (No Rosette Motif).

2. Metal Downspout Boots: Provide boot flashing, square with metal edging for attachment. Include sealant as recommended by manufacturer for sealing between downspout and boot.

a. Manufacturer: Downspoutboots.com, a division of J.R. Hoe.
b. Model: O-3436A.
c. Style: Offset.
d. Material: ASTM-A48 Class 30 Cast Iron.
e. Height: 36-inches.
f. Inlet: rectangular, 3-1/4" x 4-1/4".
g. Oulet: round, 4-1/4" O.D.
h. Finish: Light gray rust inhibitive primer.

2.7 WALL SHEET METAL FABRICATIONS

A. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch-high, end dams. Fabricate from the following materials:

1. Min. 24 gauge galvanized sheet metal, G-90, bonderized as described above.

B. Typical sheet metal flashings: L-metal, flat stock, deck to wall saddles, edge metal, etc.:

1. Min. 24 gauge galvanized sheet metal, G-90, bonderized as described above.

C. Exposed Sheet Metal at Grade:

1. 22 gauge Stainless Steel.

D. Typical exposed (i.e. penetration collars) /concealed (i.e. storefront brake metal) sheet metal flashings:

1. Min. 24 gauge galvanized sheet metal, G-90, bonderized as described above.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.

1. Verify compliance with requirements for installation tolerances of substrates.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mils.

B. Where flashing and sheet metal work is related to roofing, install under supervision of roofing applicator.

3.3 INSTALLATION, GENERAL

A. General:

1. Comply with details and profiles indicated on Drawings and SMACNA "Architectural Sheet Metal Manual" recommendations for installation of the work.
2. Coordinate installation with other work that comprises entire system of weatherproofing, waterproofing, and rain drainage.

3. Conceal fastenings, except as otherwise indicated.

    a. Conceal fasteners where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

4. Conceal reinforcement within finished assembly.
5. Install work watertight, without waves, warps, buckles, fastening stresses, distortion, "oil canning," and true to line and surface, allowing for expansion and contraction.
6. Torch cutting of sheet metal flashing and trim is not permitted.
7. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

    a. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
    b. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
    c. Space cleats not more than 12 inches (300 mm) apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
    d. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
    e. Torch cutting of sheet metal flashing and trim is not permitted.

B. Flashings:

1. Install flashings and counterflashings where shown or required to provide watertight protection.
2. Install specified self-adhesive flashing under coping and elsewhere as shown.
3. Counterflashing:

    a. Coordinate installation of counterflashing with installation of roofing or waterproofing membrane termination.
    b. Extend counterflashing 4 inches over roofing or waterproofing.
    c. Lap counterflashing joints a minimum of 4 inches and bed with butyl sealant.
    d. Secure in a waterproof manner by means of anchor and washer spaced at 36 inches centers maximum.

4. Pipe or Post Counterflashing Flashing:

    a. Install counterflashing umbrellas with close-fitting collar with top edge flaired for elastomeric sealant extending minimum of 4 inches over lead flashing or waterproofing membrane.
    b. Install stainless steel draw band and tighten.

5. Penetration Flashing Through Base Flashing:

    a. Provide prefabricated collar flashing soldered watertight with minimum 100mm (4 inch) flanges.

C. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

D. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.

1. Conceal expansion provisions where possible in exposed work and locate to minimize possibility of leakage.
2. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
3. Use lapped expansion joints only where indicated on Drawings.

E. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.

F. Seal joints as required for watertight construction.

1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
2. Prepare joints and apply sealants to comply with requirements in Section 07 92 00 "Joint Sealants."

G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets with solder to width of 1-1/2 inches; however, reduce pre-tinning where pre-tinned surface would show in completed Work.

1. Do not use torches for soldering.
2. Heat surfaces to receive solder, and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

H. Reglets:

1. Stucco Reglets: Install in accordance with ASTM C 1063.
2. Drip Caps: Provide 1/2-inch gap between drip cap and casing bead above. Do not apply sealant at this gap. Tape top flange of drip cap w/ self-adhered flashing to base layer of weather barrier product.

3.4 ROOF-DRAINAGE SYSTEM INSTALLATION

A. General: Install sheet metal roof-drainage items to produce complete roof-drainage system according to cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.

B. Hanging Gutters: Join sections with riveted and soldered joints or joints sealed with sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchor them in position. Provide end closures and seal watertight with sealant. Slope to downspouts.

C. Downspouts: Join sections with 1-1/2-inch telescoping joints.

1. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches o.c.
2. Provide elbows at base of downspout to direct water away from building.

D. Downspout Boots:

1. Anchor metal downspout boots to concrete or masonry wall construction to comply with manufacturer's written instructions.
2. Secure downspouts terminations to downspouts and substrate per manufacturer's instructions.

3.5 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch centers.

C. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal and clamp flashing to pipes that penetrate roof.

3.6 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

3.7 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

3.8 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder.

C. Clean off excess sealants.

D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturers written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.

E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

F. Protect sheet metal work as required against construction damage; remove prior to final acceptance.

END OF SECTION 07 62 00

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SECTION 07 92 00

JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Urethane joint sealants.
3. Polysulfide joint sealants.
4. Latex joint sealants.
5. Solvent-release-curing joint sealants.
6. Acoustical joint sealants.

B. Related Sections:

1. Section 07 62 00, “Sheet Metal Flashing and Trim.”
2. Section 09 29 00, "Gypsum Board" for sealing perimeter joints.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation Meeting: Review joint application procedures, compatibility tests, adhesion tests, and warranty requirements in a meeting involving installer, manufacturer or manufacturer’s representative, Owner, acoustical consultant, Architect, and Contractor.

B. Coordination:

1. Contractor shall coordinate and be responsible for compatibility and performance between sealants and other materials, and related Sections using sealants which may be in direct contact with work of this Section or adjacent to the other. Isolate and prevent of incompatibility between sealants in accordance with manufacturer's specifications, recommendations and instructions.

C. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

1.4 ACTION SUBMITTALS

A. Product Data: Manufacturer's specifications, recommendations, and installation instructions, including cleaning of joint surfaces, for each sealant material to be used.

B. Samples: For color selection, manufacturer's standard bead samples for each product exposed to view.

1.5 INFORMATIONAL SUBMITTALS

A. Statement of qualifications for applicator of exterior sealants.

B. Certification by joint sealant manufacturer that sealants plus the primers and cleaners required for sealant installation comply with local regulations controlling use of volatile organic compounds (VOCs).

C. Preconstruction Compatibility and Adhesion Test Reports from sealant manufacturer as specified. Reports shall indicate the following:

1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

D. Results of field adhesion testing including manufacturer’s appropriate joint preparation and priming techniques.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.

C. Product Testing: Test joint sealants using a qualified testing agency.

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

D. Preconstruction Compatibility and Adhesion Testing: Exterior joint sealant manufacturer shall provide compatibility and adhesion testing for proposed products provided under this Section.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multi-component materials intact and legible.

B. Store and handle materials in compliance with manufacturer's recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.8 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.9 WARRANTY

A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

C. Repair or replace joint sealants that fail to achieve airtight and watertight seal or otherwise fail to perform as intended because of leaking, crumbling, hardening, shrinkage, bleeding, sagging, staining, loss of adhesion or cohesion, or do not cure within the specified warranty periods.

D. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from natural causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

E. Contractor: Furnish Owner with a written 2-year guaranty, co-signed by installer, agreeing to repair or replace non-silicone and other elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

F. Manufacturer: Furnish Owner with manufacturer’s written 20-year warranty for sealant Types 1A and 1B agreeing to furnish sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty shall include failure due to loss of adhesion, weather seal. In addition, Type 1B sealant warranty shall include staining.
2. Contractor shall be responsible for scheduling, arranging, and providing any print review and testing required by manufacturer as a condition for issuance of its warranty.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. VOC Content of Interior Sealants: Sealants and caulks shall comply with local or regional air pollution control or air quality management district rules where applicable, or SCAQMD Rule 1168 VOC limits, as shown in Tables 4.504.1 or 4.504.2 as applicable. Such products shall also comply with Rule 1168 prohibition on the use of certain toxic components (chloroform, ethylene, dichloride, methylene chloride, perchloroethylene, and trichloroethlene), Sealants and sealant primers used inside the weatherproofing system shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Architectural Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

C. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

D. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SEALANT MATERIALS

A. Colors:

1. Concealed Material: Any of manufacturer's standard colors.
2. Exposed Material: Manufacturer's standard colors, to be selected.

B. Type 1A - Sealant for General Exposed Exterior Use: One part, neutral cure, gun-grade silicone conforming to ASTM C920, Type S, Grade NS, Class 25; SCS2000 SilPruf" by Momentive Performance Materials," or accepted equal.

C. Type 1B - Sealant for Exterior Use at Concrete and Other Porous Surfaces: Non-bleed, reduced-stain type; one part silicone conforming to ASTM C920, Type S, Grade NS, Class 25; SCS9000 SilPruf NB" by Momentive Performance Materials," or accepted equal.

D. Type 1C - Sealant for Exterior Use where Tremco products are specified: Single-Component, Nonsag, Moisture-Cure, Polyurethane Joint Sealant conforming to ASTM C 920, Type S, Grade NS, Class 50, Use NT; Greenguard certified; "Dymonic 100" by Tremco, Inc., or accepted equal.

E. Type 1D - Sealant for Exterior Use where Henry products are specified: Single-Component, Nonsag, Moisture-Cure, Silyl-terminated polyether (STPE) polymer Joint Sealant conforming to ASTM C 920, Type S, Grade NS, Class 35, Use NT; "Henry 925 BES Sealant" by Henry, Inc., or accepted equal.

F. Type 2 - Concealed Bedding Conditions: One-part butyl-rubber calk conforming to FS TT-S-001657, Type I; Pecora "BC158," or accepted equal.

G. Type 3 - Exterior and Interior Horizontal Joints Subject to Pedestrian Traffic: Two-part polyurethane conforming to ASTM C920, Class 25, Type M, self-leveling; Pecora "Urexpan NR-201," or accepted equal.

H. Type 4 - Interior Nonwet Areas: One-component acrylic latex water-based sealant conforming to ASTM C834; "Tremco "Acrylic Latex," or accepted equal.

I. Type 5 - Interior Wet Areas: One-part mold and mildew-resistant silicone rubber conforming to ASTM C920, Type S, Class 25, Grade NS; "SCS1700 Sanitary" by Momentive Performance Materials, or accepted equal.

2.3 MISCELLANEOUS SEALANT MATERIALS

A. Self-Leveling Sealant at Horizontal Joints: ASTM C920, Type S, Grade SL; single component, chemical curing, non-staining, non-bleeding, non-sagging type at concrete expansion and control joints in, plaza and terrace decks and sidewalk joints; "890SL" by Dow Corning Corporation, "Urexpan NR-200 " by Pecora Corporation, "THC-900" by Tremco, "Sikaflex 2C-FL" by by Sika, or accepted equal.

B. Perimeter Gap Sealant: Gun-dispensed, aerosol foam polyurethane or polyisocyanurate type conforming to ASTM C1620; Hilti "CF 810/812," or accepted equal.

C. Fiber Expansion Joint Material: Preformed cellular fiber complying with ASTM D1751, 1/2 inch thick unless otherwise noted; "SealTight Fiber Expansion Joint Filler" by W.R. Meadows, or accepted equal.

D. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

E. Additional Sealant Materials: As specified in the respective Specification Sections.

2.4 JOINT SEALANT BACKING

A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), Type O (open-cell material), Type B (bicellular material with a surface skin), or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.5 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

D. Bondbreaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint, to be used in areas where backer rod cannot fit and where three-sided adhesion is to be avoided. Provide self-adhesive tape where applicable.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Verify that joint sizes and surfaces are free of defects and acceptable for installation of joint sealants.

C. Verify joint dimensions and shapes to ensure they are within the sealant manufacturer’s guidelines. Resolve any variances prior to installation. Do not proceed with sealant installation until the unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

a. Concrete.
b. Masonry.

c. Unglazed surfaces of ceramic tile.
d. Exterior insulation and finish systems.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

a. Metal.
b. Glass.
c. Porcelain enamel.
d. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces. Allow primer to dry. Do not prime areas that cannot be sealed the same day.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.

a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

G. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

B. Leave finished work in a neat, clean condition with no evidence of spillovers onto adjacent surfaces.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion.

B. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 07 92 00

SECTION 08 11 13

HOLLOW METAL DOORS, BORROWED LITES AND FRAMES

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Hollow Metal doors.
2. Hollow Metal Borrowed Lite interior windows.
3. Hollow Metal (welded) Frames.

B. Related Requirements:

1. Section 06 10 00, "Rough Carpentry."
2. Section 06 16 00, "Sheathing."
3. Section 07 25 00, "Weather Barriers."
4. Section 08 71 00, "Door Hardware."
5. Section 09 24 00, "Cement Plastering."

1.3 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

B. Coordination: Hardware supplier shall furnish steel door and frame manufacturer with accepted hardware schedule, hardware templates, and samples of physical hardware where necessary to ensure correct fitting and installation. Preparation includes sinkages and cutouts for mortise and concealed hardware.

1.4 ACTION SUBMITTALS

A. Schedule and Shop Drawings:

1. Cover each type of door, frame, and frame condition.
2. Include the following specific information:

a. Elevation and material of doors and frames.
b. Jamb and head details.
c. Hardware preparation locations and reinforcing details of doors and frames.

d. Door and frame location schedule.
e. Complete door and frame descriptive nomenclature.
f. Material description and gages.
g. Meeting stile details.
h. Methods of anchorage.
i. Glass molding details.

3. Prepare Schedule using same reference numbers as those on Drawings and coordinated with door hardware schedule.

B. Product Data: Manufacturer's technical data substantiating that product comply with specified requirements.

1.5 INFORMATIONAL SUBMITTALS

A. Test Reports for each type of fire-rated hollow metal door and frame assembly if not included as part of product data submittal.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle steel doors and frames in such a manner as to prevent damage or deterioration.

B. Provide such packaging as cardboard or other containers, separators, banding, spreaders, and paper wrappings in order to protect items during transit and Project site storage.

C. Follow special storage and handling requirements of manufacturer.

D. Inspect products upon delivery for damage. Minor damage may be repaired, provided that refinished items are equal in all respects to new work and acceptable to the Architect. Otherwise, remove and replace damaged items as directed.

E. Store doors upright in a protected dry area on a raised platform at least 1 inch off the ground. Provide blocking between units so as to provide air circulation.

1.7 FIELD CONDITIONS

A. Post-Set Frames: Prepared openings shall be properly located and sized, plumb and square. Do not force-fit frames into improperly constructed openings.

B. Preset Frames: Wall/partition and frame locations shall be accurately marked before frames are erected.

PART 2 - PRODUCTS

2.1 DESIGN AND PERFORMANCE CRITERIA

A. Steel doors and frames shall comply with ANSI A250.8.

B. Work shall meet applicable requirements of the Hollow Metal Manufacturers Association (HMMA), a Division of the National Association of Architectural Metal Manufacturers (NAAMM).

C. Fire-Rated Assemblies: Wherever a fire-resistance classification is indicated, provide fire-rated steel doors and frames, investigated and tested as part of a fire door assembly, complete with type of fire door hardware to be used.

1. Identify each fire-rated door and frame with permanent, metal labels, in accordance with NFPA Standard 252, UL 10C, and CBC, from approved testing and inspection agency, indicating applicable fire rating.
2. Fire rated assemblies shall be protected by tight fitting smoke and draft control assemblies, and include door and frame with fire rating label followed by a letter "S" for smoke and draft control rating.
3. Construct and install assemblies in such a manner as to comply with NFPA Standard No. 252, or UL 10C and NFPA 80 and as specified herein.

    a. Labels: Place fire rating labels where visible when doors and frames are in installed, open positions.
    b. Temperature Rise Rating: Provide doors with maximum 450 degrees Temperature Rise Rating in 30-minute fire exposure period at doors into exit enclosures, exit vestibules, and horizontal exits.

4. Pairs of doors with vertical-rod panic exit devices shall be labeled without use of overlapping astragals.
5. Fire Ratings: Refer to Drawings for fire rating requirements.

D. Fire-Rated, Borrowed-Light Assemblies: Complying with NFPA 80 and listed and labeled by an approved testing and inspecting agency based on testing according to NFPA 257 or UL 9.

2.2 MANUFACTURERS

A. Hollow Metal Door and Frame Manufacturer: Subject to compliance with requirements, provide Medallion Series Ceco Door by Assa Abloy, 9159 Telecom Drive, Milan, TN 38358; www.cecodoor.com.

1. See drawing A301, "Door Schedule."
2. Source Limitations: Obtain hollow-metal doors and frames from single manufacturer.

B. Hollow Metal Borrowed Lite interior windows: Subject to compliance with requirements, provide heavy duty 16 gauge KD (knocked down) 4-sided hollow Borrowed Lite, by Trudoor - Doors & Hardware, 5858 W. Lower Buckeye Rd., #100, Phoenix AZ 85043-7922; 1-844-878-3667, www.trudoor.com.

1. See drawing A302, "Window Schedule," window tags W.10 and W2.0.
2. Glazing: 1/4-inch clear tempered glass; see drawing A302, "Window Schedule," glass type GL-02.
3. Source Limitations: Obtain borrowed lite glazing and frames from single manufacturer.

2.3 MATERIALS:

A. Hot-Rolled Steel Sheets and Strip: Commercial quality carbon steel, pickled and oiled, complying with ASTM A568 and ASTM A1011.

B. Cold-Rolled Steel Sheets: Commercial-quality carbon steel complying with ASTM A568 and A1008, exposed, matte finish, oiled.

C. Galvanized Steel Sheets: Commercial-quality zinc-coated carbon steel complying with ASTM A653 with A60 or G60zinc coating.

D. Supports and Anchors: Not less than 18-gage galvanized sheet steel.

E. Frame Anchors:

1. Typical: ASTM A879/A879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.
2. Anchors Built Into Exterior Walls: Steel sheet complying with ASTM A1008/A1008M or ASTM A1011/A1011M, hot-dip galvanized according to ASTM A153/A153M, Class B.

F. Inserts, Bolts, and Fasteners: Manufacturer's standard units, hot-dip galvanized according to ASTM A153/A153M..

G. Shop-Applied Paint: Rust-inhibitive primer, either air dried or baked on, suitable as a base for specified finish paints.

2.4 FABRICATION - GENERAL

A. Conform to requirements of SDI or NAAMM.

B. Fabricate hollow metal units to be rigid, neat in appearance and free from defects, warp or buckle. Accurately form metal to required sizes and profiles. Weld exposed joints continuously, grind, dress, and make smooth, flush and invisible. Metallic filler to conceal manufacturing defects is not acceptable.

C. Fabricate steel doors and frames to required profiles and sizes by forming with edges straight and sharp.

D. Doors and frames subject to exterior environmental conditions shall be fabricated from specified galvanized-steel sheets.

E. Fit and fabricate accurately with corner hairline joints and all surfaces free from warp, wave, buckle, and other defects.

F. Welding: In accordance with AWS standards for high-grade hollow metal work

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals. Obtain complete fusion without discontinuity or undercut.
2. Continuously welded door and frame seals with no filler.
3. Remove weld spatter, oxides, and flux.
4. Grind exposed welds smooth.

G. Fabricate exposed faces of doors only from cold-rolled steel.

H. Fabricate frames from either cold-rolled or hot-rolled steel (at fabricator's option).

I. Unless otherwise indicated, provide countersunk flat Phillips or Jackson heads for exposed screws and bolts.

J. Shop Painting:

1. After fabrication, thoroughly clean surfaces of mill scale, rust, oil, grease, dirt, and other foreign matter, and chemically treat with phosphate compound so as to assure maximum paint adhesion.
2. After pre-treatment of galvanized metal, apply shop coat of specified primer of even consistency in order to provide a uniformly finished surface, ready to receive finish painting.
3. Finish shall comply with ANSI/SDI A250.10.
4. Provide different colored shop primer to differentiate galvanized from non-galvanized products when delivered to Project site.

2.5 WELDED STEEL FRAMES

A. Gages:

1. Interior:

a. Frames in Openings 4’-0" or Less in Width: 16 gage unless thicker gage is included in UL test procedure for rated frames.
b. Frames in Openings over 4’-0" Width: 14 gage.

2. Exterior: 14 gage.

B. Design and Construction – Standard Frames:

1. Frames shall be custom made welded units with integral trim and backbends, of the sizes and shapes shown on approved shop drawings. Knocked-down frames will not be accepted.
2. Jamb depths, trim, profile and backbends shall be as shown on Drawings.
3. Corner joints shall have all contact edges closed tight, with trim faces mitered and continuously back welded, and stops mitered. Unless otherwise noted, the use of gussets will not be permitted.
4. Minimum depth of stops shall be 5/8 inch unless otherwise noted. Drill stops for silencers: three in strike stops for single swing doors, two in head stops for double swing doors.
5. Floor Anchors:

a. Floor anchors shall be securely welded inside each jamb for floor anchorage.
b. Where required, provide adjustable floor anchors, providing not less than 2 inch height adjustment.
c. Minimum thickness of floor anchors shall be 14 gage.

6. Jamb Anchors:

a. Frames for installation in stud partitions shall be provided with steel anchors of suitable design, not less than 18 gage thickness, securely welded inside each jamb as follows:

1) Frames up to 7 feet – 6 inches High: 4 anchors.
2) Frames 7 feet – 6 inches to 8 feet – 0 inches High: 5 anchors.
3) Frames over 8 feet – 0 inches High: 5 anchors plus one additional for each 2 feet or fraction thereof over 8 feet – 0 inches.

b. Provide ceiling struts for fire rated frames where required by ANSI/UL 63.

7. Frames shall be provided with a steel spreader temporarily attached to the feet of both jambs to serve as a brace during shipping and handling.

C. Profile bottom of jamb to contour of concrete at change in floor elevation occurring within jamb width.

D. Construct welded frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

1. Commercial Frames: NAAMM-HMMA 861. At locations indicated in the Door and Frame Schedule.
2. Shop-assemble and weld into a single unit. Saw-miter or cope and tab all frame miters. Continuously weld and grind smooth at return, face, rabbet, and stop.
3. Install frames in accordance with ANSI/SDI A250.11.
4. Physical Performance: Level A according to SDI A250.4.
5. Sidelite and Frames: Fabricated from same thickness material as adjacent door frame.
6. Construction: Welded.
7. Exposed Finish: Prime.

2.6 HOLLOW METAL DOORS

A. ANSI/SDI Classification:

1. Exterior: Level 3 and Physical Performance Level A, Model 2, extra heavy-duty seamless construction.

a. Face sheets shall be minimum 0.053 inches (16 gage).
b. Insulated, steel stiffened, for a minimum "U" value of 0.24 except where opening into unconditioned spaces.

2. Interior Non-Fire-Rated: Level 3 and Performance Level A, Model 2, seamless construction.

a. Face sheets shall be minimum 0.042 inches (18 gage).
b. Core: Honeycomb or polystyrene, laminated to the inside of both face sheets.

3. Interior Fire-Rated: Level 3 and Performance Level A, Model 2, seamless construction.

a. Face sheets shall be minimum 0.042 inches 18 gage) unless otherwise required for required rating.
b. Core: Mineral fiber or as standard with manufacturer to meet scheduled fire rating.
c. Rating: As scheduled.

B. The top and bottom of out-swinging exterior doors shall be closed with either a flush or inverted channel cap, welded, filled, and finished smooth to provide protection from entry of water inside door.

C. Design and Construction: In addition to requirements of the specified ANSI/SDI Classification, doors shall comply with the following.

1. Continuously welded door and frame seals with no filler.

2. Doors shall be custom made, of the types and sizes shown on the approved shop drawings, and shall be fully welded seamless construction with no visible seams or joints on their faces or vertical edges. Minimum door thickness shall be 1-3/4 inches.
3. Doors shall be strong, rigid and neat in appearance, free from warpage or buckles. Corner bends shall be true and straight and of minimum radius for the gage of metal used.
4. Face sheets shall be stiffened by continuous vertical formed steel sections spanning the full thickness of the interior space between door faces. These stiffeners shall be not less than 22 gage spaced not more than 6 inches apart and securely attached to face sheets by spot welds not more than 5 inches on center. Spaces between stiffeners shall be sound-deadened and thermal insulated the full height of the door with an inorganic non-combustible batt-type material.
5. Door faces shall be joined at their vertical edges by a continuous weld extending the full height of the door. Welds shall be ground, filled and dressed to make them invisible and provide a smooth flush surface.
6. Top and bottom edges of all doors shall be closed with a continuous recessed steel channel not less than 16 gage, extending the full width of the door and spot welded to both faces. Exterior doors and doors to unconditioned spaces shall have for attachment of weather stripping, a flush closure also at their bottom edges. Openings shall be provided in the bottom closure of exterior doors to permit the escape of entrapped moisture.
7. Edge profiles shall be provided on both vertical edges of doors as follows:

    a. Single-acting swing doors: beveled 1/S" in 2 inches.
    b. Double acting swing doors: rounded on 2-1/S" radius.

D. Flatness: Doors shall maintain a flatness tolerance of 1/16 inch maximum, in any direction, including in a diagonal direction.

E. Non-Rated Louvers: Stationary non-vision, inverted-"Y" blade type, 1-inch thick; Model AFDL by Anemostat Door Products, or equal.

1. Materials: 22-gage steel blades and 18 gage frame, galvanized at exterior locations.
2. Provide with insect screen at exterior doors.
3. Fasteners shall be located on secure side of door.

F. Rated Louvers: Stationary non-vision blade type, 1-inch thick, with fusible link and operating lever; Model FLDL by Anemostat Door Products, or equal.

1. Materials: 18-gage steel blades and frame.
2. Fasteners shall be located on secure side of door.

G. Glass: As specified in Section 08 80 00, "Glazing."

2.7 FINISH HARDWARE PREPARATION

A. Prepare hollow metal units to receive finish hardware, including cutouts, reinforcing, drilling and tapping in accordance with Finish Hardware Schedule and templates provided by hardware suppliers. Preparation includes sinkages and cut-outs for mortise and concealed hardware.

B. Provide minimum gage hardware reinforcing in accordance with Table IV of ANSI A250.8 and the following additional requirements.

1. Doors shall be mortised, reinforced, drilled and tapped at the factory for fully templated hardware only in accord with the approved hardware schedule and templates provided by the hardware supplier. Where surface-mounted hardware (or hardware, the interrelation of which is to be adjusted upon installation - such as top and bottom pivots, floor closers, etc.) is to be applied, doors shall have reinforcing plates.
2. Minimum gages for hardware reinforcing plates shall be as follows:

    a. Hinge and Pivot Reinforcement: 7 gage.
    b. Reinforcement for Lock Face, Flush Bolts, Concealed Holders, Concealed or Surface Mounted Closers: 12 gage.
    c. Reinforcements for All Other Surface Mounted Hardware: 16 gage.

3. Interior Hollow Metal frames at 60-Minute Fire Rated Openings: Meet manufacturer's specifications for indicated level of fire rating.

C. Comply with applicable requirements of ANSI/BHMA A156.115.

D. Locate finish hardware as shown on final shop drawings in accordance with locations noted herein.

E. Provide reinforcements for both concealed and surface applied hardware:

1. Drill and tap mortise reinforcements at factory, using templates.
2. Install reinforcements with concealed connections designed to develop full strength of reinforcements.

F. Reinforce steel doors and frames to receive surface-applied hardware.

1. Drilling and tapping for surface-applied finish hardware shall be done at Project site by hardware installer.

G. Labeled Doors and Frames: Refer to Section 08 71 00, "Door Hardware" for mounting heights of hardware on doors and frames, unless otherwise noted.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the areas and conditions where steel doors and frames are to be installed and notify the Architect of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION OF FRAMES

A. Install frames in accordance with ANSI/SDI A250.11 and the additional requirements of manufacturer for concealed jamb frames.

B. Exercise care in setting of frames in order to maintain scheduled dimensions, hold head level, and maintain jambs plumb and square.

C. Secure anchorages and connections to adjacent construction.

1. Welded Frames:

a. Provide not less than three anchors and one floor clip per side for doors up to 7 feet high and four anchors and one floor clip per side for doors over 7 feet high.
b. Frames over 36 inches wide shall have one anchor at head.
c. Anchors shall be furnished to suit wall conditions and floor angles or clips welded to frame for fastening to floor.
d. Wherever possible, leave frame spreader bars intact until frames are set perfectly square and plumb and anchors are securely attached. Do not use shipping bars as spreaders.

D. Allow for expansion movement as required.

E. Install fire-rated frames in accordance with NFPA Standard No. 80.

F. Frames at sound-rated doors shall be filled with mineral wool insulation.

3.3 INSTALLATION OF DOORS

A. Install steel doors in accordance with manufacturer's instructions and Project requirements.

B. Place fire-rated doors with clearances as specified in NFPA Standard No. 80.

C. Do not erect members that are observed to be warped, bowed, deformed, or otherwise damaged or defaced to such extent as to impair strength or appearance. Remove and replace members that have been damaged in process of erection.

D. Apply hardware in accordance with requirements specified in Section 08 71 00 "Door Hardware."

E. Adjust operable parts for correct function.

3.4 ADJUST AND CLEAN

A. Prime Coat Touch-up: Immediately after erection, items with damaged prime coat shall be sanded smooth and touched up with same primer as applied at shop.

1. Remove rust before above-specified touch-up is applied.
2. Touch-up shall not be obvious after application of finish coats.

B. Final Adjustments: Check and readjust operating finish hardware items, leaving steel items undamaged and in complete and proper operating condition.

C. Hollow metal frames or doors which are defective, have hardware cutouts of improper size or location, or which prevent proper installation of doors, hardware or work of other trades, shall be removed and replaced with new at no additional cost to Owner.

3.5 PROTECTION

A. Protect installed work against damage from other construction work and until ready to receive final finish painting as specified in Sections 09 91 13, "Exterior Painting," and 09 91 23, "Interior Painting."

END OF SECTION 08 11 13

SECTION 08 14 23

CLAD WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Ultimate Inswing/Outswing French Door and frame complete with hardware, glazing, weather strip, insect screen, simulated divided lites with spacer bars (SDSL), and stationary sidelites, stationary transoms, and jamb extensions where indicated in the drawings, panels as shown in the drawings, interior shades, and standard anchors, trim, attachments, and accessories.
2. Ultimate Arch Top Inswing / Outswing French Door and frame complete with glazing, weather strip, hardware, insect screen, simulated divided lites with spacer bars (SDSL), and jamb extensions where indicated in the drawings, panels as shown in the drawings, and standard anchors, trim, attachments, and accessories.

B. Related Requirements:

1. Section 06 10 00, "Rough Carpentry."
2. Section 06 16 00, "Sheathing."
3. Section 07 25 00, "Weather Barriers."
4. Section 08 71 00, "Door Hardware."
5. Section 09 24 00, "Cement Plastering."

1.3 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

1.4 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. E283: Standard Test Method for Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors

2. E330: Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
3. E547: Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic
4. E2190: Specification for Sealed Insulating Glass Units
5. C1036: Standard Specification for Flat Glass
6. E 2112: Standard Practice for Installation of Exterior Windows, Doors, and Skylights

B. American Architectural Manufacturer's Association / Window and Door Manufacturer's Association (AAMA / WDMA/CSA):

1. AAMA/WDMA/CSA 101/I.S.2/A440-08: North American Fenestration, Standard/Specification for windows, doors, and skylights
2. AAMA/WDMA/CSA 101/I.S.2/A440-11: NAFS - North American Fenestration, Standard/Specification for windows, doors, and skylights

C. WDMA I.S.4: Industry Standard for Water Repellant Preservative Treatment for Millwork

D. Window and Door Manufacturer's Association (WDMA): 101/I.S.2 WDMA Hallmark Certification Program

E. Sealed Insulating Glass Manufacturer's Association / Insulating Glass Certification Council (SIGMA/IGCC)

F. American Architectural Manufacturer's Association (AAMA): 2605: Voluntary Specification for High Performance Organic Coatings on Architectural Extrusions and Panels

G. National Fenestration Rating Council (NFRC):

1. 101: Procedure for Determining Fenestration Product Thermal Properties
2. 200: Procedure for Determining Solar Heat Gain Coefficients at Normal Incidence

H. Window Covering Manufacturer's Association

1. A100.1: Standard for safety of corded window covering products

1.5 SYSTEM DESCRIPTION

A. Design and Performance Requirements:

1. Rectangular Inswing French Door:

Product	Air Tested to psf	Water Tested to psf	Structural Tested to psf	Certification Rating	Design Pressure (DP)	Overall Width		Overall Height		# of Panels
						in	mm	in	mm	
Ultimate Inswing French Door 3680 (O)	1.57	6	60	LC-PG40-FD LC-PG40-SLT	40	43 7/16	(1103)	95 1/2	(2426)	1
Ultimate Inswing French Door 7080 (XX)	1.57	6	45	LC-PG30-SHD	30	84 5/8	(2149)	95 1/2	(2426)	2
Ultimate Inswing French Door 12070 (OXXO)	1.57	3	30	R-PG20-SHD	20	143	(3632)	86	(2184)	4
Ultimate Inswing French Door 12080 (OXXO)	1.57	6	60	LC-PG40-SHD	40	143	(3632)	95 1/2	(2426)	4
Ultimate Inswing French Door	1.57	4.5	45	LC-PG30-SHD	30	167	(4242)	95 1/2	(2426)	4

14080 (OXXO)										
Ultimate Inswing French Door Arch Top 6080 (XX)	1.57	6	60	LC-PG40-SHD	40	72 5/8	(1845)	95 1/2	(2426)	2

2. Rectangular Outswing French Door:

Product	Air Tested to psf	Water Tested to psf	Structural Tested to psf	Certification Rating	Design Pressure (DP)	Overall Width		Overall Height		# of Panels
						in	mm	in	mm	
Ultimate Outswing French Door 3680 (O)	1.57	7.5	75	LC-PG50-SLT	50	43 7/16	(1103)	95 1/2	(2426)	1
Ultimate Outswing French Door 9080 (OOX)	1.57	6	60	LC-PG40-SHD	40	107 13/16	(2738)	95 1/2	(2426)	3
Ultimate Outswing French Door 6080 (XX)	1.57	7.5	75	LC-PG50-SHD	50	72 5/8	(1845)	95 1/2	(2426)	2
Ultimate Outswing French Door 14070 (OXXO)	1.57	3.75	37.5	LC-PG25-SHD	25	167	(4242)	86	(2184)	4
Ultrimate Outswing French Door 14080 (OXXO)	1.57	4.5	45	LC-PG30-SHD	30	167	(4242)	95 1/2	(2426)	4

1.6 SUBMITTALS

A. Product Data: For each type of product required.

B. Shop Drawings: Showing methods of installation, plans, sections, elevations and details of walls, specified loads, flashings, vents, sealants, and interfaces with all materials not supplied by the patio door manufacturer, and identification of proposed component parts and finishes.

C. Samples: Selection and verification samples for finishes, colors and textures. Submit two complete sample sets of each type of material required.

D. Samples:

1. Selection and verification samples for finishes, colors and textures. Submit two complete sample sets of each type of material required.
2. Include glazing system, quality of construction and specified finish

E. Certificates: Signed by manufacturer certifying materials comply with specified performance characteristics, criteria and physical requirements.

F. Test and Evaluation Reports: Showing compliance with specified performance characteristics and physical properties.

G. Manufacturer's Instructions: Manufacturer installation, storage, and other instructions.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum five years of experience.

1.8 DELIVERY

A. Protect finished surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond when exposed to sunlight or weather.

1.9 STORAGE AND HANDLING

A. Prime and seal wood surfaces, including to be concealed by wall construction, if more than thirty (30) days will expire between delivery and installation. Seal unfinished top and bottom edges of door panels if panels are stored at the job site more than one (1) week.

B. Store door panels flat on a level surface in a clean and dry storage area above ground to protect from weather.

C. Condition doors to local average humidity before hanging.

1.10 WARRANTY

A. Complete and current warranty information is available at marvin.com/warranty. The following summary is subject to the terms, condition, limitations and exclusions set forth in the Marvin Windows and Door Limited Warranty and Products in Coastal Environments Limited Warranty Supplement:

B. Clear insulating glass with stainless steel spacers is warranted against seal failure caused by manufacturing defects and resulting in visible obstruction through the glass for twenty (20) years from the original date of purchase. Glass is warranted against stress cracks caused by manufacturing defects from ten (10) years from the original date of purchase.

C. Standard exterior aluminum cladding finish is warranted against manufacturing defects resulting in chalk, fade and loss of adhesion (peel) per the American Architectural Manufacturer’s Association (AAMA) Specification 2605-11 Section 8.4 and 8.9 for twenty (20) years from the original date of purchase.

D. Factory-applied interior finish is warranted to be free from finish defects for a period of five (5) years from the original date of purchase.

E. Hardware another non-glass components are warranted to be free from manufacturing defects for ten (10) years from the original date of purchase.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Description: Factory-assembled Ultimate Inswing / Outswing French Door and/or related stationary units as manufactured by Marvin Windows and Doors, Ripley, Tennessee.

B. Description: Factory-assembled Ultimate Inswing / Outswing French Door Arch Top and/or related stationary units as manufactured by Marvin Windows and Doors, Ripley, Tennessee.

2.2 FRAME DESCRIPTION

A. Interior: Non Finger-Jointed Pine or finger-jointed core with non finger-jointed Pine veneer; optional non finger-jointed Mixed Grain Douglas Fir or finger-jointed core with non finger-jointed Mixed Grain Douglas Fir veneer; optional non finger-jointed White Oak or finger-jointed with non finger-jointed Oak veneer; non finger-jointed Cherry or finger-jointed core with Cherry veneer; non finger-jointed Mahogany or finger-jointed core with non finger-jointed Mahogany veneer; non finger-jointed Vertical Grain Douglas Fir or finger-jointed with non finger-jointed Vertical Grain Douglas Fir veneer.

1. Kiln-dried to moisture content no greater than twelve (12) percent at time of fabrication.
2. Water repellant, preservative treated in accordance with WDMA I.S.4.

B. Frame exterior aluminum clad with 0.050-inches thick extruded aluminum.

C. Frame width: 4 9/16-inches ; 6 9/16-inches.

D. Frame thickness: 1 1/16-inches.

E. Inswing French Door Sill: A single pultrusion of Fiber Reinforced Plastic (FRP), also known as Ultrex®, provides superior thermal performance.

1. An integral weep system is part of a water management system that directs any incidental moisture to the exterior.
2. Sill depth is 5 5/8-inches for 4 9/16-inches wall application and 7 5/8-inches for 6 9/16-inch jambs.
3. Standard finish is beige with an option for bronze.
4. Optional interior sill liner available in Oak, Mahogany, or Cherry. Standard feature for arch top doors.
5. Optional exterior sill cover in Mahogany for O, X, or XX operating configurations.
6. Optional factory-applied low profile sill, meets ADA requirements (non-certified).

F. Outswing French Door Sill: A single pultrusion of Fiber Reinforced Plastic (FRP), also known as Ultrex ™, provides superior thermal performance

1. Sill depth is 5 21/32-inches for 4 9/16-inches and 6 9/16-inches wall application
2. Optional interior sill liner available in: Oak, Mahogany, or Cherry. Standard feature for arch top doors.
3. Standard finish is beige with any option for bronze
4. Optional interior sill cover in Mahogany for all operating configurations
5. Optional factory applied low profile sill, meets ADA requirements

G. Wood Trim for Arch Top Doors: Standard is Pine, optional Red Oak interior radius trim

2.3 PANEL DESCRIPTION

A. Interior: Non Finger-Jointed Pine or finger-jointed core with non finger-jointed Pine veneer; optional non finger-jointed Mixed Grain Douglas Fir or finger-jointed core with non finger-jointed Mixed Grain Douglas Fir veneer; optional non finger-jointed White Oak or finger-jointed with non finger-jointed Oak veneer; non finger-jointed Cherry or finger-jointed core with Cherry veneer; non finger-jointed Mahogany or finger-jointed core with non finger-jointed Mahogany veneer.

1. Kiln-dried to moisture content no greater than twelve (12) percent at time of fabrication
2. Water repellant, preservative treated in accordance with WDMA I.S.4.

B. Panel exterior aluminum clad with 0.050-inches thick extruded aluminum

C. Panel thickness: 1 3/4-inches.

D. Top rail and stile width: 4 3/4-inches.

E. Sidelite stile width: 3-inches.

F. Traditional French Door bottom rail height: 8 1/8-inches.

G. Contemporary Door bottom rail height: 4 3/4-inches.

H. Panel corners glued and fastened with 5/8-inches x 4-inches fluted hardwood dowels. Removable interior vinyl glazing stops with non finger-jointed wood covers. No visible fasteners.

I. Arch Top radius glazing stop is nailed with 1 1/8-inches (29) brad nail.

2.4 GLAZING

A. Select quality complying with ASTM C 1036; Shall comply with 16 CFR 1201 Safety Standard for Architectural Glazing Materials.

B. Glazing Method: Tempered Insulating Glass (altitude adjusted).

C. Standard interior wood cope sticking: Ogee.

1. Optional interior wood cope sticking: Square.
2. Contemporary doors will default to Interior Square sticking with an option to select Ogee.

D. Glass Type: Clear, Bronze, Gray, Reflective Bronze, Tempered, Obscure, Laminated, Low E2 with or without Argon, Low E3 with or without Argon, Low E1 with or without Argon, Low E2/ERS Argon or air, Low E3/ERS Argon or air.

E. Glazing Seal: Silicone bedding, exterior.

2.5 FINISH

A. Exterior: Aluminum Clad. Fluoropolymer modified acrylic topcoat applied over primer. Meets AAMA 2605 requirements.

1. Aluminum clad color options: Bahama Brown, Bronze, Cadet Gray, Cascade Blue, Cashmere, Clay, Coconut Cream, Ebony, Evergreen, Gunmetal, Hampton Sage, Pebble Gray, Sierra White, Stone White, Suede, Wineberry, Bright Silver (pearlescent), Copper (pearlescent), Liberty Bronze (pearlescent).
2. Custom colors: Contact your Marvin representative.

B. Interior Finish Options:

1. Prime: Factory-applied enamel primer. Available on Pine product only. Meets WDMA TM-11 requirements.
2. Painted Interior Finish. Available on Pine product only. Available in White or Designer Black. Meets WDMA TM-14 requirements.
3. Factory-applied water-borne acrylic enamel clear coat. Applied in two separate coats with light sanding between coats. Available on Pine, Mahogany, Vertical Grain Douglas Fir, Mixed Grain Douglas Fir, Cherry, or White Oak. Meets WDMA TM-14 requirements.
4. Factory-applied water-borne stain. Stain applied over a wood (stain) conditioner. A water-borne acrylic enamel clear coat applied in two separate coats, with light sanding coats, applied over the stain. Available on Pine, Mahogany, Vertical Grain Douglas Fir, Mixed Grain Douglas Fir, Cherry, or White Oak. Colors available: Wheat, Honey, Hazelnut, Leather, Cabernet, or Espresso. Meets WDMA TM-14 requirements.

2.6 HARDWARE

A. Adjustable Hinges:

1. 4 1/4-inches x 3 3/4-inches with 3/8-inch radius corners. Adjustment is 3/16-inch for horizontal and vertical of panels in frame.
2. Rectangular doors have three adjustable hinges on 6-6, 6-8, 7-0 and 8-0 heights; optional four hinges on 7-0 and 8-0 heights.
3. Arch top doors have three adjustable hinges up to 80-inches. Units greater than 84-inches have four hinges.
4. Finish: Satin Taupe with steel substrate.

    a. Optional powder coat finish: Gold tone, Dark Bronze, Silver Frost, White.

5. Optional metal finish: Brass PVD, Oil Rubbed Bronze PVD, Satin Nickel PVD, Antique Brass, Satin Chrome, Oil Rubbed Bronze, or Polished Chrome.

B. Butt Hinges:

1. 4-inches x 4-inches with radius corners.
2. Outswing hinge has a non-removable pin.
3. Units with rough opening height < 86 1/2: have three hinges, units with rough opening greater or equal to 86 1/2-inches up to 110 1/2-inches have four hinges, units with rough opening greater than 110 1/2-inches have five hinges.

4. Finish (Inswing) Default: Satin Taupe with steel substrate.

    a. Optional finish: Brass Plated, Solid Brass, Antique Brass, Oil Rubbed Bronze, Satin Chrome, Satin Nickel, White, Stainless Steel, Polished Chrome, or Satin Nickel PVD.

5. Finish (Outswing) Default: Solid Brass, Stainless Steel, or Satin Nickel PVD.

C. Optional Ball Bearing Hinges for 1 3/4-inches doors.

1. Dimensions: 4-inches x 4-inches with radius corners.
2. Finish Default: Satin Chrome (US26D) with solid brass substrate; Optional Finishes: Bronze (US10A) with solid brass substrate, Brass (US3) with solid brass substrate.
3. Quanity per panel:

    a. Unit rough opening height less than 86 ½-inches = 3 hinges per panel.
    b. Unit rough opening height greater than or equal to 86 1/2 up to 110 1/2-inches = 4 hinges per panel.
    c. Unit rough opening height greater than 110 1/2-inches = 5 hinges per panel.

D. Traditional Handle Set: Active, Inactive, Dummy:

1. Powder Coat finishes: Satin Taupe, White, and Dark Bronze (zinc die cast substrate).
2. Metal finishes Brass PVD, Oil Rubbed Bronze PVD, Satin Nickel PVD, Antique Brass, Satin Chrome, Oil Rubbed Bronze, or Polished Chrome (brass substrate).

E. Contemporary Handle Set: Active, Inactive, Dummy:

1. Painted finishes: Satin Taupe or Dark Bronze (aluminum substrate).
2. PVD finishes: Oil rubbed Bronze or Satin Nickel.

F. Locking System:

1. Active panel: Marvin exclusive concealed multi-point locking system. Stainless steel head and shoot bolts operated from lever set. One inch dead bolt.
2. Inactive panel: Manual stainless steel head and shoot bolts with dummy handle. Optional Stainless steel head and shoot bolts operated with inactive handle.
3. Optional: Mortise lock and passage latch on active panel, prep for passage latch with deadbolt, or no lock/no bore.

2.7 LOCK STATUS SENSOR (OPTIONAL)

A. Lock Status Sensor

1. Unit is factory-prepared for an integrated lock status sensor system. Contact sensor mounted inside the boundaries of the operating panel. Refer to Lock Status Sensor Installation Instructions.
2. Lock Status Sensor wireless only.

    a. Only wireless option available. Requires purchase of secondary transmitter for operation. Marvin will prep for this option.

3. For Swinging Doors, the sensor will always be integrated into the locking hardware system.

4. The actuator (keyed or thumb turn) is integrated into the locking hardware system.

2.8 WEATHER STRIP

A. Inswing: Head jamb and side jambs to have 2 rows of bulb weather strip maintaining contact with door panels

1. Color: Beige or black

B. Outswing: Head jamb and side jambs to have single bulb weather strip maintaining contact with door panels

1. Color: Beige or black

C. Inswing and Outswing: Threshold to have bulb weather strip maintaining contact with bottom of panel

1. Color: Beige or black

D. Inswing: Vinyl panel drip applied to bottom rail

1. Color: Beige or black

E. Inswing Arch Top: Painted aluminum watershed and weep system at sill

1. Color: Beige or black

F. Panel: Active panel sweep, inactive panel sweep, panel weather strip, panel cover weather strip, astragal weather strip, bulb weather strip

1. Color: Beige or black

G. Surface mounted aluminum panel drip mounted at bottom of panel (shipped loose for field application)

1. Standard colors: Matches panel finish with matching screws
2. Custom colors: Matches panel finish with stainless steel screws

2.9 JAMB EXTENSION

A. Factory-applied up to 3-inches (2-inches for Inswing Arch Top), for other wall thickness indicated or required (shipped loose).

B. Finish: Matches interior frame finish.

2.10 INSECT SCREEN (INSWING ONLY)

A. Standard/Ultimate Sliding Screen

1. Extruded aluminum sliding frame, top hung roller assembly with stainless steel ball bearings in nylon wheels, top rollers adjustable up to ¼-inches (6mm). Frame to have edge mounted wool pile bug strip.
2. Sliding screen for XO, OX, OOX, XOO, OXXO operation.
3. Standard Sliding Screen available in Bahama Brown, Bronze, Evergreen, Pebble Gray, or White.
4. Ultimate Sliding Screen comes with a roller bar and profile replicates the look of a traditional wood screen. Screen will match exterior aluminum clad color.
5. Standard screen mesh: Charcoal fiberglass, or High Trans fiberglass.
6. Ultimate screen mesh: Charcoal fiberglass, Charcoal Aluminum Wire, Black Aluminum Wire, Bright Aluminum Wire, Bright Bronze Wire.

B. Standard/Ultimate Swinging Screen (Rectangular Inswing Unit Only):

1. Extruded aluminum swinging frame. Standard swinging screen available in Bahama Brown, Bronze, Evergreen, Pebble Gray, or White.
2. Ultimate swinging screen with screen and glass insert is available to match exterior aluminum clad frame color. Glass insert is tempered and available in clear, green, bronze or gray tint.
3. Screen mesh: Charcoal fiberglass, Bronze, Charcoal Aluminum, Silver Aluminum, Black Aluminum, or High Transparency screen mesh (CH Hi-Tran) fiberglass.
4. For standard swinging screen: black hinges: 2 for doors under 90-inches and 3 hinges for doors over 90-inches . Ultimate swinging screen has 4 hinges per panel and a factory installed Z-bar.
5. Handle includes latch with exterior handle and internal locking mechanism. Available in Bronze, Satin Nickel, Brass, or Satin Taupe.

2.11 SIMULATED DIVIDED LITES (SDL)

A. 5/8-inches wide, 7/8-inches (22mm) wide, 1 1/8-inches wide, 1 15/16-inches, 2 13/32-inches wide with or w/out internal spacer bar.

B. Muntins: Pine, Mixed Grain Douglas Fir, White Oak, Cherry, Mahogany, Vertical Grain Douglas Fir.

C. Muntins adhere to glass with double coated acrylic foam tape.

D. Sticking:

1. Standard: Ogee.
2. Optional: Square.

E. Pattern: Rectangular, Cottage, Custom lite layout.

F. Finish: Match panel finish.

2.12 RAISED OR FLAT PANELS

A. 0.080-inch aluminum to the exterior with foam backing and laminated veneer to interior for stamped raised panel. Available bare wood or selected interior finish. Available in all aluminum clad colors for exterior. Aluminum clad colors meeting AAMA 2605 requirements.

B. 0.125-inch aluminum to the exterior with foam backing and laminated veneer to interior for flat panel. Available bare wood or selected interior finish. Available in all aluminum clad colors for exterior. Aluminum clad colors meeting AAMA 2605 requirements.

C. Utilizes 4 3/4-inch intermediate rail. Visible panel height is 12 1/64-inch.

2.13 ACCESSORIES AND TRIM

A. Installation and Hardware Accessories:

1. Factory-installed vinyl nailing/drip cap.
2. Installation brackets: 6 3/8-inches, 9 3/8-inches, 15 3/8-inches.
3. Masonry brackets: 6-inches, 10-inches.

B. Aluminum Extrusions:

1. Casing Profile: Brick Mould Casing (BMC), Flat Casing, Stucco Brick Mould, Stucco Flat Casing, Columbus Casing, Grayson Casing, Ridgeland Casing, Stratton Casing, Thorton Casing, Potter Casing, 1 1/2-inches Flat Casing.
2. Aluminum clad Extrusion: Frame Expander, Jamb Extender, Mullion Cover, Mullion Expander.
3. Finish: Match exterior frame finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Condition:

1. Verify wall openings and adjoining air and vapor seal materials are ready to receive work of this Section.
2. Before installation, verify openings are plumb, square and of proper dimensions as required.
3. Report defects or unsuitable conditions to the General Contractor before proceeding.

B. Acceptance of Condition: Beginning of installation confirms acceptance of existing conditions.

3.2 INSTALLATION

A. Assemble and install door unit(s) according to manufacturer’s instruction and reviewed shop drawing.

B. Install doors plumb, level and square. Anchor doors securely to structure in correct orientation to flashing and adjacent construction as indicated. Comply with product installation instructions for proper flashing integration into wall system. Install doors so as to drain water penetration to the exterior.

C. Install sealant and related backing materials at perimeter of unit or assembly in accordance with Section 07 92 00, "Joint Sealants." Do not use expansive foam sealant.

D. Install accessory items as required.

E. Use finish nails to apply wood trim and mouldings.

3.3 FIELD QUALITY CONTROL

A. Remove visible labels and adhesive residue according to manufacturer's instruction.

B. Unless otherwise specified, air leakage resistance tests shall be conducted at a uniform static pressure of 75 Pa (~1.57 psf). The maximum allowable rate of air leakage shall not exceed 2.3 L/sm^2 (~0.45 cfm/ft^2).

C. Unless otherwise specified, water penetration resistance testing shall be conducted per AAMA 502 and ASTM E1105 at 2/3 of the fenestration products design pressure (DP) rating using "Procedure B" cyclic static air pressure difference. Water penetration shall be defined in accordance with the test method(s) applied.

3.4 CLEANING

A. Remove visible labels and adhesive residue according to manufacturer's instruction.

B. Leave windows and glass in a clean condition.

3.5 PROTECTION

A. Protecting doors from damage by chemicals, solvents, paint or other construction operations that may cause damage.

END OF SECTION 08 14 23

SECTION 08 14 33

STILE AND RAIL WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

A. Architectural interior stile and rail wood doors.

B. Related Requirements:

1. Section 06 10 00, "Rough Carpentry."
2. Section 06 16 00, "Sheathing."
3. Section 07 25 00, "Weather Barriers."
4. Section 08 71 00, "Door Hardware."
5. Section 09 24 00, "Cement Plastering."

1.3 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

1.4 REFERENCES

A. NFPA 80 – Standard for Fire Doors and Other Opening Protectives.

B. Window and Door Manufacturers Association:

1. I.S.6-A-13 – Industry Standards for Architectural Wood Stile & Rail Doors.
2. TR-8 UV Cured Acrylated Polyester Urethane

1.5 SUBMITTALS

A. Product Data: Submit manufacturer's product data.

B. Shop Drawings: Submit manufacturer's shop drawings, including elevations, sections, and details, indicating door construction, dimensions, tolerances, materials, panels, hardware, glass, louvers, and finish.

C. Samples:

1. Doors: Submit manufacturer's construction samples of doors showing materials and finish.
2. Color: Submit manufacturer’s door finish samples, showing range of color variation.

D. Manufacturer’s Certification: Submit manufacturer’s certification that doors comply with specified requirements and are suitable for intended application.

E. Cleaning Instructions: Submit manufacturer's cleaning instructions for doors.

F. Warranty: Submit manufacturer's standard warranty.

1.6 QUALITY ASSURANCE

A. Identifying Label: Each door shall bear identifying label indicating:

1. Door manufacturer.
2. Order number.
3. Door number.
4. Fire rating, if applicable.

B. Fire-Rated Doors: Labeled by UL/QAI.

1. Construction Details and Hardware Application: Approved by labeling agency.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery:

1. Deliver doors to site in manufacturer’s original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Storage:

1. Store doors in accordance with manufacturer’s instructions.
2. Store doors in clean, dry area indoors, protected from damage and direct sunlight.
3. Store doors flat on level surface.
4. Do not store doors directly on concrete.
5. Keep doors completely covered. Use covering which allows air circulation and does not permit light to penetrate.
6. Store doors between 50 and 90 degrees F and 25 to 55 percent relative humidity.
7. Do not subject doors to sudden changes in temperature or relative humidity.

C. Handling:

1. Handle doors in accordance with manufacturer’s instructions.
2. Protect doors and finish during handling and installation to prevent damage.
3. Handle doors with clean hands or clean gloves.

4. Lift and carry doors. Do not drag doors across other doors or surfaces.

1.8 WARRANTY

A. Warrant interior doors for a limited lifetime in interior use against warpage, delamination, and defects in materials and workmanship.

B. Defects noted during warranty period shall be corrected at no cost to Owner. Corrective work shall include labor and material for repair, replacement, refinishing, and rehanging as required.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. VT Industries, Inc., One Eggers Drive, Two Rivers, Wisconsin, 54241. Phone (920) 793-1351. www.vtindustries.com. door_info@vtindustries.com.

2.2 STILE AND RAIL WOOD DOORS

A. Architectural Interior Stile and Rail Wood Doors: Eggers Collection.

1. Eggers Solid Core ei Door w/ Woodland Faux Wood Pattern.

a. Pattern: TBD.

B. Compliance: WDMA I.S.6-A-13, custom grade.

C. Design:

1. Panel Type: As shown in the Drawings; see A301, "Door Schedule."

D. Non-Rated Doors and 20-Minute Fire Doors: Eggers Collection.

1. Door Thickness: 1-3/4 inches.
2. Stile Width: 6 inches, unless otherwise noted.
3. Mullion Width: 5 inches, unless otherwise noted.
4. Rails:

a. Top Rail Width: 6 inches, unless otherwise noted.
b. Lock Rail Width: 5 inches, unless otherwise noted.
c. Cross Rail Width: 5 inches, unless otherwise noted.
d. Bottom Rail Width: 10 inches, unless otherwise noted.

5. Panels:

a. Flat Panel Thickness: 5/8 inch.
b. Raised Panel Thickness: 1-1/8 inches.

6. Glass:

a. Type: Clear tempered glass per Glass Types as shown on A302, "Window Schedule."
b. Thickness: as shown on A302, "Window Schedule."

7. Bar/Muntin:

a. Width: 1/2 inch for non-rated doors; ¾ inch for 20-minute doors
b. Thickness: 1-3/4 inches.

8. Veneers:

a. Species:
b. Cut: [Plain sliced] [Quarter] [ ].

E. 45-Minute Fire-Rated Doors: Eggers Collection.

1. Door Thickness: 1-3/4 inches.
2. Stile Width: 6 inches.
3. Mullion Width: 5 inches.
4. Rails:

a. Top Rail Width: 6 inches.
b. Lock Rail Width: 5 inches.
c. Cross Rail Width: 5 inches.
d. Bottom Rail Width: 10 inches.

5. Panels:

a. Flat Panel Thickness: 5/8 inch.
b. Raised Panel Thickness: 1-1/2 inches.
c. Minimum Panel Size: 7 inches by 7 inches.

6. Fire Labels: Attach permanent fire label on hinge stile of each fire-rated door or on the top of the door if doors have a continuous hinge.

2.3 DOOR CONSTRUCTION

A. Stile Edge: Matching wood edge.

B. Inner Stile and Rail:

1. Non-Rated Doors and 20-Minute Fire-Rated Doors: Specified wood veneer pressed over particleboard (Structural Composite Lumber available).
2. 45--Minute Fire-Rated Doors: Specified wood veneer pressed over noncombustible material.

C. Panels:

1. Non-Rated Doors and 20-Minute Fire-Rated Doors: Specified wood veneer pressed over composite wood core.
2. 45-Minute Fire-Rated Doors: Specified wood veneer pressed over fire-retardant core.

D. Stile and Rail Joints: Doweled construction.

E. Hinges: Factory drill pilot holes.

F. Sticking Used with Panels or Glass: Ogee.

2.4 HARDWARE

A. Factory machine doors in accordance with templates from specified hardware manufacturers and hardware schedule.

2.5 FINISH

A. Stile and Rail Doors: Manufacturer’s factory finish.

B. Factory Finish: VT Industries factory finish.

1. Description: WDMA TR-8 UV Cured Acrylated Polyester Urethane

a. Clear Finish: Clear.
b. Stain Color: As selected by Architect from Manufacturer's standard selection.
c. Prime for opaque finished doors.

2. Sealers and Topcoats: WDMA TR-8 (UV Cured Acrylated Polyester Urethane).

C. Top and Bottom Rails: Factory sealed only if door is finished

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine locations to receive doors. Notify Architect of conditions that would adversely affect installation or subsequent use. Do not begin installation until unacceptable conditions are corrected.

B. Ensure frames are solidly anchored, allowing no deflection when doors are installed.

C. Ensure frames are plumb, level, square, and within tolerance.

3.2 PREPARATION

A. Allow doors to become acclimated to building temperature and relative humidity for a minimum of 24 hours before installation.

3.3 INSTALLATION

A. Install doors in accordance with manufacturer’s instructions. Install doors at locations indicated on the [Door Schedule] [Drawings].

B. Install doors plumb, level, and square.

C. Install door hardware as specified in Section 08 71 00, "Door Hardware."

3.4 ADJUSTING

A. Adjust doors to swing freely, without binding in frame.

B. Adjust hardware to operate properly.

C. Repair minor damages to finish in accordance with manufacturer’s instructions and as approved by Architect.

D. Remove and replace damaged doors that cannot be successfully repaired, as determined by Architect.

3.5 CLEANING

A. Clean doors promptly after installation in accordance with manufacturer’s instructions.

B. Do not use harsh cleaning materials or methods that could damage finish.

3.6 PROTECTION

A. Protect installed doors from damage during construction.

END OF SECTION 08 14 33

SECTION 08 31 13

ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes

1. Access doors and frames for walls and ceilings.

B. Related Requirements:

1. Section 09 29 00, "Gypsum Board."
2. Section 07 92 00, "Joint Sealants."

1.3 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, fire ratings, materials, individual components and profiles, and finishes.

B. Shop Drawings:

1. Include plans, elevations, sections, details, and attachments to other work.
2. Detail fabrication and installation of access doors and frames for each type of substrate.

C. Samples: For each door face material, at least 3 by 5 inches in size, in specified finish.

D. Product Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics according to the following test method and that are listed and labeled by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. NFPA 252 or UL 10B for fire-rated access door assemblies installed vertically.
2. NFPA 288 for fire-rated access door assemblies installed horizontally.

2.2 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

A. Manufacturers: Subject to compliance with requirements, provide "UFR-DW – Fire-rated Access Door," 22-inch x 30-inch access door by Milcor, Inc.

B. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.

C. Fire-Rated, Flush Access Doors with Exposed Flanges:

1. Basis-of-Design Product: Milcor.
2. Assembly Description: Fabricate door to fit flush to frame, uninsulated. Provide self-latching door with automatic closer and interior latch release. Provide manufacturer's standard-width exposed flange, proportional to door size.
3. Locations: Ceiling.
4. Fire-Resistance Rating: Not less than 1 hour.
5. Uncoated Steel Sheet for Door: Nominal 0.036 inch, 20 gage.

    a. Finish: Factory prime.

6. Frame Material: Same material, thickness, and finish as door.
7. Hinges: Manufacturer's standard.
8. Hardware: Latch.

2.3 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Steel and Metallic-Coated-Steel Finishes:

1. Factory Prime: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

2. Factory Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry-film thickness of 1 mil for topcoat.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

B. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.3 ADJUSTING

A. Adjust doors and hardware, after installation, for proper operation.

B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 08 31 13

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SECTION 08 52 13

ALUMINUM-CLAD WOOD WINDOWS

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Marvin Ultimate Double Hung Picture Round Top G2, Picture window complete with hardware, glazing, certified mulls, weather strip, simulated divided lite, jamb extension, and standard anchors, trim, attachments, factory-applied historic casing(s) and accessories.

    a. See A302, "Window Schedule."

2. Marvin Ultimate Double Hung Picture G2, Picture window complete with hardware, glazing, certified mulls, weather strip, simulated divided lite, jamb extension, and standard anchors, trim, attachments, factory-applied historic casing(s) and accessories.

    a. See A302, "Window Schedule."

B. Related Requirements:

1. Section 06 10 00, "Rough Carpentry."
2. Section 06 16 00, "Sheathing."
3. Section 07 25 00, "Weather Barriers."
4. Section 08 80 00, "Glazing."
5. Section 09 24 00, "Cement Plastering."

1.3 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

1.4 REFERENCES

A. American Society for Testing Materials (ASTM):

1. E283: Standard Test method for Rate of Air Leakage through Exterior Windows, Curtain Walls and Doors

2. E330: Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls and Door by Uniform Static Air Pressure Difference
3. E547: Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Cyclic Static Air Pressure Differential
4. E2190: Specification for Sealed Insulated Glass Units
5. C1036: Standard Specification for Flat Glass
6. E2112: Standard Practice for Installation of Exterior Windows, Doors and Skylights
7. E2068: Standard Test Method for Determination of Operating Force of Sliding Windows and Doors
8. F2090: Standard Specification for Window Fall Prevention Devices with Emergency Escape (Egress) Release Mechanisms.

B. American Architectural Manufacturer's Association/Window and Door Manufacturer's Association (AAMA/WDMA/CSA):

1. AAMA/WDMA/CSA 101/I.S.2/A440-08, Standard/Specification for windows, doors and skylights
2. AAMA/WDMA/CSA 101/I.S.2/A440-11, Standard/Specification for windows, doors and skylights
3. AAMA 450-10, Voluntary Performance Rating Method for Mulled Fenestration Assemblies

C. WDMA I.S.4: Industry Standard for Water Repellant Preservative Treatment for Millwork.

D. Window and Door Manufacturer's Association (WDMA): 101/I.S.2 WDMA Hallmark Certification Program.

E. Sealed Insulating Glass Manufacturer's Association/Insulating Glass Certification Council (SIGMA/IGCC).

F. American Architectural Manufacturer's Association (AAMA): 2605: Voluntary Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.

G. National Fenestration rating Council (NFRC):

1. 101: Procedure for Determining Fenestration Product thermal Properties.
2. 200: Procedure for Determining Solar Heat Gain Coefficients at Normal Incidence.

1.5 SYSTEM DESCRIPTION

A. Performance Requirements: As specified in PART 2, with the following additional requirements:

1. System Design: Design and size components to withstand dead and live loads caused by pressure and suction of wind acting normal to plane of window.

   a. Calculate design pressures in accordance with applicable code.

2. Deflection: Limit member deflection to 1/175 of the longer dimension with full recovery of glazing materials.
3. Assembly: To accommodate, without damage to components or deterioration of seals, movement between window and perimeter framing, deflection of lintel.

4. Energy Efficiency: Exterior curtainwall system shall have certified and labeled energy performance ratings in accordance with NFRC.

    a. Thermal Transmittance (U-factor): When tested to AAMA Specification 1503, the thermal transmittance (U-factor) shall not be more than 0.27 Btu/sq. ft. x h x deg F as determined according to NFRC 100.
    b. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.37 as determined according to NFRC 200.

5. Air Infiltration: Limit air infiltration through assembly to 0.3 cu ft/min/sq ft of wall area, measured at a reference differential pressure across assembly of 1.57 psf as measured in accordance with ASTM E 283.
6. Vapor Seal: No vapor seal failure at interior static pressure of 1 inch, 72 degrees F, and 40 percent relative humidity.
7. Condensation Resistance Factor: CRF of 60* when measured in accordance with AAMA 1503.
8. Water Leakage: None, when measured in accordance with ASTM E 331 at a pressure differential of 15psf in the lab. Field test to be conducted in accordance with AAMA 502-08.
9. System Internal Drainage: Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to the exterior by a weep drainage network.
10. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glass and heel bead of glazing compound. Position thermal insulation on exterior surface of air barrier and vapor retarder.
11. Thermal Movement: Design sections to permit movement caused by thermal expansion and contraction of plastic to suit glass, infill, and perimeter opening construction.

    a. Design Temperature Range: 120 F degrees.

B. Manufacturer Design and Performance Requirements

Product	Air Tested to psf	Water Tested to psf	Structural Tested to psf	Certification Rating	Design Pressure (DP)	Max Overall Width	Max Overall Height
Ultimate Casement Picture (Full Frame and Narrow Frame)	1.57	10.5	75	AW-PG50-FW	50	60"	99"
Ultimate Casement Picture (Full Frame and Narrow Frame)	1.57	7.5	75	CW-PG50-FW	50	64"	96-1/8"
Ultimate Casement Picture (Full Frame and Narrow Frame)	1.57	7.5	75	CW-PG50-FW	50	64"	104"
Ultimate Casement Picture (Full Frame and Narrow Frame)	1.57	7.5	75	CW-PG50-FW	50	96-1/8"	64"
Ultimate Casement Picture (Full Frame and Narrow Frame)	1.57	10.5	75	AW-PG50-FW	50	99"	60"
Ultimate Casement Picture (Full Frame and Narrow Frame)	1.57	7.5	75	CW-PG50-FW	50	104"	64"
Ultimate Casement Picture (Full Frame)	1.57	7.5	75	CW-PG50-FW	50	72"	71-1/8"
Ultimate Casement Picture (Full Frame)	1.57	7.5	75	CW-PG50-FW	50	88"	96-1/8"
Ultimate Casement Picture (Full Frame)	1.57	7.5	75	CW-PG50-FW	50	96-1/8"	88"
Ultimate Casement Picture (Full Frame)	1.57	7.5	60	CW-PG40-FW	40	80"	120"
Ultimate Casement Picture (Full Frame)	1.57	7.5	60	CW-PG40-FW	40	120"	80"

1.6 SUBMITTALS

A. Product Data: Provide component dimensions, anchorage and fasteners, glass, internal drainage details.

B. Shop Drawings: Indicate opening dimensions, framed opening tolerances, affected related work, installation requirements.

C. Samples: Submit two window and frame sections, 12 x 12 inch in size, illustrating window frame section, mullion section, screen and frame, and finished surfaces.

D. Submit two samples of operating hardware.

E. Manufacturer's Certificate: Certify that products of this section meet or exceed specified requirements.

F. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum five years of experience.

1.8 DELIVERY

A. Protect finished surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond when exposed to sunlight or weather.

1.9 STORAGE AND HANDLING

A. Prime and seal wood surfaces, including to be concealed by wall construction, if more than thirty (30) days will expire between delivery and installation

B. Store window units in an upright position in a clean and dry storage area above ground to protect from weather.

1.10 WARRANTY

A. Clear insulating glass with stainless steel spacers is warranted against seal failure caused by manufacturing defects and resulting in visible obstruction through the glass for twenty (20) years from the original date of purchase. Glass is warranted against stress cracks caused by manufacturing defects from ten (10) years from the original date of purchase.

B. Standard exterior aluminum cladding finish is warranted against manufacturing defects resulting in chalk, fade and loss of adhesion (peel) per the American Architectural Manufacturer's Association (AAMA) Specification 2605-11 Section 8.4 and 8.9 for twenty (20) years from the original date of purchase.

C. Factory-applied interior finish is warranted to be free from finish defects for a period of five (5) years from the original date of purchase.

D. Hardware and other non-glass components are warranted to be free from manufacturing defects for ten (10) years from the original date of purchase.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Description: Ultimate Double Hung G2 (and related stationary units) as manufactured by Marvin, Warroad, Minnesota.

2.2 FRAME DESCRIPTION

A. Interior: Non Finger-Jointed Pine or finger-jointed core with non finger-jointed Pine veneer; optional non finger-jointed Douglas Fir or finger-jointed core with non finger-jointed Douglas Fir veneer; optional non finger-jointed White Oak or finger-jointed with non finger-jointed Oak veneer; non finger-jointed Cherry or finger-jointed core with Cherry veneer; non finger-jointed Mahogany or finger-jointed core with non finger-jointed Mahogany veneer; non finger-jointed Vertical Grain Douglas Fir or finger-jointed with non finger-jointed Vertical Grain Douglas Fir veneer.

1. Kiln-dried to moisture content no greater than twelve (12) percent at the time of fabrication
2. Water repellant preservative treated in accordance with WDMA I.S.4.

B. Frame exterior aluminum clad with 0.050 inch thick extruded aluminum.

C. Frame thickness:

1. Ultimate Double Hung G2: 11/16" head and jambs.

D. Frame depths for full frame units have an overall 5 21/32-inch jamb. 4 9/16-inch jamb depth from the nailing fin plane to the interior face of the frame for new construction.

E. Sill assembly including the sill liner:

1. Ultimate Double Hung G2: 2 7/32".

2.3 SASH DESCRIPTION

A. Interior: Non Finger-Jointed Pine or finger-jointed core with non finger-jointed Pine veneer; optional non finger-jointed Douglas Fir or finger-jointed core with non finger-jointed Douglas Fir veneer; optional non finger-jointed White Oak or finger-jointed with non finger-jointed Oak veneer; non finger-jointed Cherry or finger-jointed core with Cherry veneer; non finger-jointed Mahogany or finger-jointed core with non finger-jointed Mahogany veneer; non finger-jointed Vertical Grain Douglas Fir or finger-jointed with non finger-jointed Vertical Grain Douglas Fir veneer.

1. Kiln-dried to moisture content no greater than twelve (12) percent at the time of fabrication.
2. Water repellant preservative treated with accordance with WDMA I.S.4.

B. Sash exterior aluminum clad with 0.050” (1.3mm) thick extruded aluminum.

C. Sash thickness:

1. Ultimate Double Hung G2: 1 3/4”, Corner slot and tenoned.

a. Operable sash tilt to interior for cleaning or removal.
b. Sash Options:

1) Standard: Equal Sash.
2) Unequal Sash (optional).
3) Both Sash Stationary (optional).

D. Stiles and Rails: 2 1/16-inches.

E. Sash Option: Optional tall bottom rail: 3 9/16-inches.

F. Interior Sash Sticking

1. Standard: Ogee.
2. Optional: Square Sticking and Ovolo profile.

2.4 GLAZING

A. Select quality complying with ASTM C 1036. Insulating glass SIGMA/IGCC certified to performance level CBA when tested in accordance with ASTM E 2190.

B. Glazing method: Insulating glass.

C. Glazing seal: Silicone bedding at interior and exterior.

D. Insulating glass will be altitude adjusted with capillary tubes for higher elevations. Argon gas is not available for elevations that require capillary tubes.

E. Glass Type: Clear, Bronze, Gray, Reflective Bronze, Tempered, Obscure, Laminated, Low E2, Low E3, Low E1, Low E2/ERS, Low E3/ERS.

1. Thermal Transmission (U-Factor), NFRC 100:
2. Solar Heat Gain Coefficient (SHGC), NFRC 200:
3. Visible Light Transmittance (VLT), NFRC 200:

4. Sound Transmission Class (STC)/Outdoor Indoor Transmission Classification (OITC), ASTM E90:

F. Dual-pane thickness:

1. Ultimate Casement: 3/4".

2.5 FINISH

A. Exterior: Aluminum clad. Fluoropolymer modified acrylic topcoat applied over primer. Meets or exceeds AAMA 2605 requirements.

1. Aluminum clad color options: Bahama Brown, Bronze, Cadet Gray, Cascade Blue, Cashmere, Clay, Coconut Cream, Ebony, Evergreen, Gunmetal, Hampton Sage, Pebble Gray, Sierra White, Stone White, Suede, Wineberry, Bright Silver (pearlescent), Copper (pearlescent), Liberty Bronze (pearlescent).
2. Custom colors: Contact your Marvin representative.

B. Interior Finish options:

1. Prime: Factory-applied enamel primer. Available on Pine product only. Meets WDMA TM-11 requirements.
2. Painted Interior Finish. Available on Pine product only. Available in White or Designer Black. Meets WDMA TM-14 requirements.
3. Factory-applied water-borne acrylic enamel clear coat. Applied on two coats with light sanding between coats. Available on Pine, Mahogany, Mixed Grain Douglas Fir, Vertical Grain Douglas Fir, Cherry, White Oak. Meets WDMA TM-14 requirements.
4. Factory-applied water-borne urethane stain. Stain applied over a wood (stain) conditioner. A water-borne acrylic enamel clear coat applied in two separate coats, with light sanding between coats, applied over the stain. Available on Pine, Mahogany, Mixed Grain Douglas Fir, Vertical Grain Douglas Fir, Cherry, White Oak. Colors available: Wheat, Honey, Hazelnut, Leather, Cabernet, and Espresso. Meets WDMA TM-14 requirements.

2.6 WEATHER STRIP

A. Ultimate Double Hung G2 Weather Strip:

1. Operating units:

a. Jambs: Foam-filled bulb
b. Header: Continuous dual leaf
c. Bottom rail and check rail: Hollow bulb

2. Stationary units:

a. Jambs: Foam for picture units; foam-filled bulb for transom unit
b. Header and bottom rail: Hollow bulb

2.7 JAMB EXTENSION

A. Jamb extensions are available for various wall thickness factory-applied up to a 12" wide.

B. Finish: Match interior frame finish.

2.8 SIMULATED DIVIDED LITES (SDL)

A. 5/8” wide, 7/8” wide, 1 1/8” wide, 1 15/16”, 2 13/32” wide with or w/out internal spacer bar.

B. Exterior muntins: 0.055” thick extruded aluminum.

C. Interior muntins: Pine, Douglas Fir, White Oak, Cherry, Mahogany, Vertical Grain Douglas Fir.

D. Muntins adhere to glass with closed-cell copolymer acrylic foam tape.

E. Sticking:

1. Standard: Ogee.
2. Optional: Square.

F. Patterns: Rectangular, diamond, custom lite cut.

G. Finish: exterior matches exterior aluminum clad colors, interior matches’ interior wood species and color.

2.9 ACCESSORIES AND TRIM

A. Installation Accessories:

1. Factory-installed vinyl nailing/drip cap
2. Installation brackets: 6 3/8”, 9 3/8”, 15 3/8”.
3. Masonry brackets: 6”, 10”.

B. Aluminum Extrusions:

1. Casing Profile: Brick Mould Casing (BMC), Flat Casing, Columbus Casing, Grayson Casing, Ridgeland Casing, Stratton Casing, Thorton Casing, Potter Casing
2. Aluminum clad Extrusion: Frame Expander, Jamb Extender, Mullion Cover, Mullion Expander, Subsill, Subsill End Cap and Lineal Cap
3. Finish: Fluoropolymer modified acrylic topcoat applied over primer. Meets AAMA 2605 requirements
4. Available in all exterior aluminum clad colors

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Condition:

1. Verify wall openings and adjoining air and vapor seal materials are ready to receive work of this Section.
2. Before installation, verify openings are plumb, square and of proper dimensions as required.

3. Report defects or unsuitable conditions to the General Contractor before proceeding.

B. Acceptance of Condition: Beginning of installation confirms acceptance of existing conditions.

3.2 INSTALLATION

A. Assemble and install window unit(s) according to manufacturer's instruction and reviewed shop drawing.

B. Install sealant and related backing materials at perimeter of unit or assembly in accordance with Section 07 92 00, "Joint Sealants." Do not use expansive foam sealant.

C. Install accessory items as required.

D. Use finish nails to apply wood trim and mouldings.

3.3 FIELD QUALITY CONTROL

A. Remove visible labels and adhesive residue according to manufacturer's instruction.

B. Unless otherwise specified, air leakage resistance tests shall be conducted at a uniform static pressure of 75 Pa (~1.57 psf). The maximum allowable rate of air leakage shall not exceed 2.3 L/sm^2 (~0.45 cfm/ft^2).

C. Unless otherwise specified, water penetration resistance testing shall be conducted per AAMA 502 and ASTM E1105 at 2/3 of the fenestration products design pressure (DP) rating using "Procedure B" cyclic static air pressure difference. Water penetration shall be defined in accordance with the test method(s) applied.

3.4 ADJUSTING

A. Adjust hardware for smooth operation and secure weather-tight closure.

3.5 CLEANING

A. Remove visible labels and adhesive residue according to manufacturer's instruction.

B. Leave windows and glass in a clean condition.

3.6 PROTECTING INSTALLED CONSTRUCTION

A. Protecting windows from damage by chemicals, solvents, paint or other construction operations that may cause damage.

END OF SECTION 08 52 13

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SECTION 08 71 00

DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions of Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes items known commercially as finish or door hardware that are required for swing, sliding, and folding doors, except special types of unique hardware specified in the same sections as the doors and door frames on which they are installed.

B. This Section includes the following, but is not necessarily limited to:

1. Door Hardware, including electric hardware.
2. Storefront and Entrance door hardware.
3. Digital keypad access control devices.
4. Wall or floor-mounted electromagnetic hold-open devices.
5. Power supplies for electric hardware.
6. Thresholds, gasketing and weather-stripping.
7. Door silencers or mutes.

C. Related Sections: The following sections are noted as containing requirements that relate to this Section, but may not be limited to this listing.

1. Division 8: Section - Steel Doors and Frames.
2. Division 8: Section - Wood Doors.
3. Division 8: Section - Aluminum Storefront
4. Division 28: Section - Fire/Life-Safety Systems & Security Access Systems.

1.3 REFERENCES (USE DATE OF STANDARD IN EFFECT AS OF BID DATE.)

A. 2022 California Building Code, CCR, Title 24.

B. BHMA – Builders' Hardware Manufacturers Association

C. CCR – California Code of Regulations, Title 24, Part 2, California State Accessibility Standards.

D. DHI – Door and Hardware Institute

E. NFPA - National Fire Protection Association.

1. NFPA 80 - Fire Doors and Other Opening Protectives
2. NFPA 105 - Smoke and Draft Control Door Assemblies

F. UL - Underwriters Laboratories.

1. UL 10C - Fire Tests of Door Assemblies
2. UL 305 - Panic Hardware

G. WHI - Warnock Hersey Incorporated

H. SDI - Steel Door Institute

1.4 SUBMITTALS & SUBSTITUTIONS

A. General: Submit in accordance with Conditions of the Contract and Division 1 Specification sections.

B. Submit product data (catalog cuts) including manufacturers' technical product information for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.

C. Submit schedule organized vertically into “Hardware Sets” with index of doors and headings, indicating complete designations of every item required for each door or opening. Include following information:

1. Include a Cover Sheet with;

a. Job Name, location, telephone number.
b. Architects name, location and telephone number.
c. Contractors name, location, telephone number and job number.
d. Suppliers name, location, telephone number and job number.
e. Hardware consultant's name, location and telephone number.

2. Job Index information included;

a. Numerical door number index including; door number, hardware heading number and page number.
b. Complete keying information (referred to DHI hand-book "Keying Systems and Nomenclature"). Provision should be made in the schedule to provide keying information when available; if it is not available at the time the preliminary schedule is submitted.
c. Manufacturers' names and abbreviations for all materials.
d. Explanation of abbreviations, symbols, and codes used in the schedule.
e. Mounting locations for hardware.
f. Clarification statements or questions.
g. Catalog cuts and manufacturer’s technical data and instructions.

3. Vertical schedule format sample:

Heading Number 1 (Hardware group or set number – HW -1)						
			(a) 1 Single Door #1 - Exterior from Corridor 101		(b) 90°	(c) RH
				(d) 3' 0"x7' 0" x 1-3/4" x (e) 20 Minute (f) WD x HM		
(g) 1	(h)	(i) ea		(j) Hinges - (k) 5BB1HW 4.5 x 4.5 NRP (l) ½ TMS	(m) 626	(n) IVE
2	6AA	1 ea		Lockset - ND50PD x RHO x RH x 10-025 x JTMS	626	SCH

(a) - Single or pair with opening number and location. (b) - Degree of opening (c) - Hand of door(s) (d) - Door and frame dimensions and door thickness. (e) - Label requirements if any. (f) - Door by frame material. (g) - (Optional) Hardware item line #. (h) - Keyset Symbol. (i) - Quantity. (j) - Product description. (k) - Product Number. (l) - Fastenings and other pertinent information. (m) - Hardware finish codes per ANSI A156.18. (n) - Manufacture abbreviation.

D. Make substitution requests in accordance with Division 1. Substitution requests must be made prior to bid date. Include product data and indicate benefit to the project. Furnish samples of any proposed substitution.

E. Wiring Diagrams: Provide product data and wiring and riser diagrams for all electrical products listed in the Hardware Schedule portion of this section.

F. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.

G. Templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

H. Furnish as-built/as-installed schedule with close-out documents, including keying schedule and transcript, wiring/riser diagrams, manufacturers' installation and adjustment and maintenance information.

I. Fire Door Assembly Testing: Submit a written record of each fire door assembly to the Owner to be made available to the Authority Having Jurisdiction (AHJ) for future building inspections.

J. LEED Certification Points: Submit information and certifications necessary to achieve maximum points for LEED certification; coordinate and cooperate with Owner and Architect in providing information necessary for required LEED rating.

1.5 QUALITY ASSURANCE

A. Obtain each type of hardware (latch and lock sets, hinges, closers, exit devices, etc.) from a single manufacturer.

B. Supplier Qualifications: A recognized architectural door hardware supplier, with warehousing facilities in the project's vicinity, that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this project and that employs an experienced architectural hardware consultant (AHC) who is available to Owner, Architect, and Contractor, at reasonable times during the course of the Work, for consultation.

1. Responsible for detailing, scheduling and ordering of finish hardware.
2. Meet with Owner to finalize keying requirements and to obtain final instructions in writing.
3. Stock parts for products supplied and are capable of repairing and replacing hardware items found defective within warranty periods.

C. Hardware Installer: Company specializing in the installation of commercial door hardware with five years documented experience.

D. Fire-Rated Openings: Provide door hardware for fire-rated openings that complies with NFPA Standard No. 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and tested by UL or Warnock Hersey for given type/size opening and degree of label. Provide proper latching hardware, door closers, approved-bearing hinges and seals whether listed in the Hardware Schedule or not.

1. Where emergency exit devices are required on fire-rated doors, (with supplementary marking on doors' UL labels indicating "Fire Door to be Equipped with Fire Exit Hardware") provide UL label on exit devices indicating "Fire Exit Hardware".

E. Exit Doors: Operable from inside with single motion without the use of a key or special knowledge or effort.

F. Product packaging to be labelled in compliance with CA Prop 65, Safe Drinking Water and Toxic Enforcement Act of 1986.

1.6 DELIVERY, STORAGE AND HANDLING

A. Coordinate delivery of packaged hardware items to the appropriate locations (shop or field) for installation.

B. Hardware items shall be individually packaged in manufacturers’ original containers, complete with proper fasteners. Clearly mark packages on outside to indicate contents and locations in hardware schedule and in work.

C. Provide locked storage area for hardware, protect from moisture, sunlight, paint, chemicals, etc.

D. Contractor to inventory door hardware jointly with representatives of hardware supplier and hardware installer until each all are satisfied that count is correct.

1.7 WARRANTY

A. Provide warranties of respective manufacturers’ regular terms of sale from day of final acceptance as follows:

1. Mechanical Locksets: Ten (10) years.
2. Electro-mechanical locksets: Three (3) years
3. Closers: Thirty (30) years.

4. Mechanical exit devices: Ten (10) years
5. Electro-mechanical exit devices: Five (5) years
6. All other hardware: Three (3) years.

1.8 MAINTENANCE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

1.9 PRE-INSTALLATION CONFERENCE

A. Convene a pre-installation conference at least one week prior to beginning work of this section.

B. Attendance: Architect, Construction Manager, Contractor, Security Contractor, Hardware Supplier, Installer, Key Owner Personnel, and Project Inspector.

C. Agenda: Review hardware schedule, products, installation procedures and coordination required with related work. Review Owner’s keying standards.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Item	Manufacturer	Acceptable Substitutes
Hinges	Ives	Hager, Stanley, McKinney
Locks, Latches& Cylinders	Schlage	Or Approved Equal
Exit Devices	Von Duprin	Or Approved Equal
Closers	LCN	Or Approved Equal
Push, Pulls & Protection Plates	Ives	Trimco, BBW, DCI
Flush Bolts	Ives	Trimco, BBW, DCI
Dust Proof Strikes	Ives	Trimco, BBW, DCI
Coordinators	Ives	Trimco, BBW, DCI
Stops	Ives	Trimco, BBW, DCI
Overhead Stops	Glynn-Johnson	Or Approved Equal
Thresholds	Zero	Pemko, National Guard
Seals & Bottoms	Zero	Pemko, National Guard

2.2 MATERIALS

A. Hinges: Exterior out-swinging door butts shall be non-ferrous material and shall have stainless steel hinge pins. All doors to have non-rising pins.

1. Hinges shall be sized in accordance with the following:

a. Height:

1) Doors up to 42" wide: 4-1/2" inches.
2) Doors 43" to 48" wide: 5 inches.

b. Width: Sufficient to clear frame and trim when door swings 180 degrees.
c. Number of Hinges: Furnish 3 hinges per leaf to 7'-5" in height. Add one for each additional 2 feet in height.

2. Furnish non-removable pins (NRP) at all exterior out-swing doors and interior key lock doors with reverse bevels.

B. Continuous Hinges: As manufactured by Ives, an Allegion Company. UL rated as required.

C. Schlage “L” Series as scheduled with “17” Style Lever and “A” Style Rose.

1. Locksets to comply with ANSI A156.13, Series 1000, Operational Grade 1 and Security Grade 1 with all standard trims. Locksets shall also comply with UL10C Positive Pressure requirements
2. Lock case shall be manufactured with heavy 12 gauge steel with fully wrapped design. Lock cases with exposed edges are not acceptable. Lock case shall be multi-functional allowing transformation to a different function without opening lock case.
3. Latchbolt shall have ¾” throw and be non-handed, field reversible without opening the lock case. Solid latchbolts and / or plastic anti-friction devices are not acceptable.
4. The deadbolt, when used, shall be 1” throw stainless steel with a ¾” internal engagement when fully extended.
5. All trim shall be through-bolted with the spring cages supporting the trim attached to the lock cases to prevent torqueing.
6. Levers to have independent rotation in both directions. Exterior lever assembly to be one-piece design attached by threaded bushing. Interior lever assembly shall be attached by screwless shank
7. Thru-bolt lever assemblies through the door for positive interlock. Locks using a through the door spindle for attachment are not acceptable. Spindles shall be independent, designed to “break-away” at a maximum of 75psi torque.
8. Hand of lock chassis to be changeable by simply moving one screw from one side to the case to the other and pulling and reversing the latchbolt.
9. Cylinders to be secured by a cast stainless steel, dual retainer. Locks utilizing screws and / or stamped retainers are not acceptable.

D. Deadlocks: Rotating cylinder trim rings of attack-resistant design. Mounting plates and actuator shields of plated cold-rolled steel. Mounting screws of ¼” diameter steel and protected by drill-resistant ball bearings. Steel alloy deadbolt with hardened steel roller. Strike alloy deadbolt with reinforcer and two 3” long screws. ANSI A156.5, 2001 Grade 1 certified.

E. Exit devices: Von Duprin as scheduled.

1. Provide certificate by independent testing laboratory that device has completed over 1,000,000 cycles and can still meet ANSI/BHMA A156.3 - 2001 standards.

2. All internal parts shall be of cold-rolled steel with zinc dichromate coating.
3. Mechanism case shall have an average thickness of .140".
4. Compression spring engineering.
5. Non-handed basic device design with center case interchangeable with all functions.
6. All devices shall have quiet return fluid dampeners.
7. All latchbolts shall be deadlocking with ¾" throw and have a self-lubricating coating to reduce friction and wear.
8. Device shall bear UL label for fire and or panic as may be required.
9. All surface strikes shall be roller type and utilize a plate underneath to prevent movement.
10. Lever Trim: "Breakaway" design, forged brass or bronze escutcheon with a minimum of .130" thickness, match lockset lever design.
11. Removable Mullions: Removable with single turn of building key. Securely reinstalled without need for key.
12. Furnish glass bead kits for vision lites where required.
13. All Exit Devices to be sex-bolted to the doors.
14. Panic Hardware shall comply with CBC Section 11B.404.2.7 and shall be mounted between 34" and 44" above the finished floor surface.

    a. Provide exit devices UL certified to meet maximum 5 pound requirements according to the California Building Code section 11B-309.4, and UL listed for Panic Exterior Fire Exit Hardware.

F. Closers: LCN as scheduled. Place closers inside building, stairs, room, etc.

1. Door closer cylinders shall be of high strength cast iron construction with double heat treated pinion shaft to provide low wear operating capabilities of internal parts throughout the life of the installation. All door closers shall be tested to ANSI/BHMA A156.4 test requirements by a BHMA certified testing laboratory. A written certification showing successful completion of a minimum of 10,000,000 cycles must be provided.
2. All door closers shall be fully hydraulic and have full rack and pinion action with a shaft diameter of a minimum of 11/16 inch and piston diameter of 1 inch to ensure longevity and durability under all closer applications.
3. All parallel arm closers shall incorporate one piece solid forged steel arms with bronze bushings. 1-9/16" steel stud shoulder bolts, shall be incorporated in regular arms, hold-open arms, arms with hold open and stop built in. All other closers to have forged steel main arms for strength, durability, and aesthetics for versatility of trim accommodation, high strength and long life.
4. All parallel arm closers so detailed shall provide advanced backcheck for doors subject to severe abuse or extreme wind conditions. This advanced backcheck shall be located to begin cushioning the opening swing of the door at approximately 45 degrees. The intensity of the backcheck shall be fully adjustable by tamper resistant non-critical screw valve.
5. Closers shall be installed to permit doors to swing 180 degrees.
6. All closers shall utilize a stable fluid withstanding temperature range of 120 degrees F. to -30 degrees F. without requiring seasonal adjustment of closer speed to properly close the door.
7. Provide the manufactures drop plates, brackets and spacers as required at narrow head rails and special frame conditions. NO wood plates or spacers will be allowed.

8. Maximum effort to operate closers shall not exceed 5 lbs., such pull or push effort being applied at right angles to hinged doors. Compensating devices or automatic door operators may be utilized to meet the above standards. When fire doors are required, the maximum effort to operate the closer may be increased but shall not exceed 15 lbs. when specifically approved by fire marshal. All closers shall be adjusted to operate with the minimum amount of opening force and still close and latch the door. These forces do not apply to the force required to retract latch bolts or disengage other devices that hold the door in a closed position. Per 11B-404.2.8.1, door shall take at least 5 seconds to move from an open position of 90 degrees to a position of 12 degrees from the latch jamb.

G. Flush Bolts & Dust Proof Strikes: Automatic Flush Bolts shall be of the low operating force design. Utilize the top bolt only model for interior doors where applicable and as permitted by testing procedures.

1. Manual flush bolts only permitted on storage or mechanical openings as scheduled.
2. Provide dust proof strikes at openings using bottom bolts.

H. Door Stops:

1. Unless otherwise noted in Hardware Sets, provide floor type with appropriate fasteners. Where wall type cannot be used, provide floor type. If neither can be used, provide overhead type.
2. Do not install floor stops more than four (4) inches from the face of the wall or partition (CBC Section 11B-307).
3. Overhead stops shall be made of stainless steel and non-plastic mechanisms and finished metal end caps. Field-changeable hold-open, friction and stop-only functions.

I. Protection Plates: Fabricate either kick, armor, or mop plates with four beveled edges. Provide kick plates 10" high and 2" LDW. Sizes of armor and mop plates shall be listed in the Hardware Schedule. Furnish with machine or wood screws of bronze or stainless to match other hardware.

J. Thresholds: As Scheduled and per details.

1. Thresholds shall not exceed 1/2" in height, with a beveled surface of 1:2 maximum slope.
2. Set thresholds in a full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements in Division 7 “Thermal and Moisture Protection”.
3. Use ¼” fasteners, red-head flat-head sleeve anchors (SS/FHSL).
4. Thresholds shall comply with CBC Section 11B-404.2.5.

K. Seals: Provide silicone gasket at all rated and exterior doors.

1. Fire-rated Doors, Resilient Seals: UL10C Classified complies with NFPA 80 & NFPA 252. Coordinate with selected door manufacturers' and selected frame manufacturers' requirements.
2. Fire-rated Doors, Intumescent Seals: Furnished by selected door manufacturer. Furnish fire-labeled opening assembly complete and in full compliance with UL10C Classified complies with NFPA 80 & NFPA 252. Where required, intumescent seals vary in requirement by door type and door manufacture -- careful coordination required.
3. Smoke & Draft Control Doors, Provide UL10C Classified complies with NFPA 80 & NFPA 252 for use on “S” labeled Positive Pressure door assemblies.

L. Door Shoes & Door Top Caps: Provide door shoes at all exterior wood doors and top caps at all exterior out-swing doors.

M. Silencers: Furnish silencers for interior hollow metal frames, 3 for single doors, 2 for pairs of doors. Omit where sound or light seals occurs, or for fire-resistive-rated door assemblies.

2.3 KEYING

A. Furnish a Proprietary Schlage masterkey system as directed by the owner or architect. Key system to be designated and combinated by the Schlage Master Key Department even if pinned by the Authorized Key Center, Authorized Security Center or a local authorized commercial dealer.

B. A detailed keying schedule is to be prepared by the owner and/or architect in consultation with a representative of Allegion or an Authorized Key Center or Authorized Security Center. Each keyed cylinder on every keyed lock is to be listed separately showing the door #, key group (in BHMA terminology), cylinder type, finish and location on the door.

C. Establish a new masterkey system for this project as directed by the keying schedule.

D. Furnish all cylinders in the Schlage Full Size Interchangeable Core (FSIC). Pack change keys independently (PKI)

E. Furnish construction keying for doors requiring locking during construction.

F. Furnish all keys with visual key control.

1. Stamp key “Do Not Duplicate”.
2. Stamp (BHMA) key symbol on key.

G. Furnish all cylinders with visual key control.

1. Stamp (BHMA) key symbol on side of cylinder (CKC).

H. Furnish mechanical keys as follows:

1. Furnish 2 cut change keys for each different change key code.
2. Furnish 1 uncut key blank for each change key code.
3. Furnish 6 cut masterkeys for each different masterkey set.
4. Furnish 3 uncut key blanks for each masterkey set.
5. Furnish 2 cut control keys cut to the top masterkey for permanent I/C cylinders.
6. Furnish 1 cut control key cut to each SKD combination.
7. Furnish KS43D2200 padlock for use with non-I/C Schlage cylinders. Furnish 47-413 (conventional) or 47-743-XP (PrimusXP) with above.
8. Furnish KS43G3200 padlock for use with FSIC Schlage cylinders. Furnish 23-030 (Classic / Everest) or 20-740 (PrimusXP) with above.
9. Furnish KS41D1200 padlock for use with SFIC Schlage cylinders. Furnish 80-037 (Everest-B) with above.

I. Furnish Schlage Padlocks and the cylinders to tie them into the masterkey system for gates, storage boxes, utility valve security, roof hatches and roll-up doors keyed as directed in the keying schedule.

1. Furnish KS43D2200 padlock for use with non-I/C Schlage cylinders. Furnish 47-413 (conventional) or 47-743-XP (PrimusXP) with above.
2. Furnish KS43G3200 padlock for use with FSIC Schlage cylinders. Furnish 23-030 (Classic / Everest) or 20-740 (PrimusXP) with above.

3. Furnish KS41D1200 padlock for use with SFIC Schlage cylinders. Furnish 80-037 (Everest-B) with above.

J. Furnish one Schlage cabinet lock for each cabinet door or drawer so designated on the drawings or keying schedule to match the masterkey system.

1. Furnish CL100PB for use with non-I/C Schlage cylinders.
2. Furnish CL771R for use with FSIC Schlage cylinders.
3. Furnish CL721G for use with SFIC Schlage cylinders.

2.4 FINISHES

A. Generally, to be oil-rubbed bronze unless otherwise noted.

B. Furnish push plates, pull plates and kick or armor plates in oil-rubbed bronze unless otherwise noted.

C. Door closers shall be powder-coated to match other hardware, unless otherwise noted.

D. Aluminum items to be finished anodized aluminum except thresholds which can be furnished as standard mill finish.

2.5 FASTENERS

A. Screws for strikes, face plates and similar items shall be flat head, countersunk type, provide machine screws for metal and standard wood screws for wood.

B. Screws for butt hinges shall be flathead, countersunk, full-thread type.

C. Fastening of closer bases or closer shoes to doors shall be by means of sex bolts and spray painted to match closer finish.

D. Provide expansion anchors for attaching hardware items to concrete or masonry.

E. All exposed fasteners shall have a phillips head.

F. Finish of exposed screws to match surface finish of hardware or other adjacent work.

G. All Exit Devices and Lock Protectors shall be fastened to the door by the means of sex bolts or through bolts.

PART 3 - EXECUTION

3.1 INSPECTION

A. Verify that doors and frames are square and plumb and ready to receive work and dimensions are as instructed by the manufacturer.

B. Beginning of installation means acceptance of existing conditions.

C. Fire-Rated Door Assembly Inspection: Upon completion of the installation, all fire door assemblies shall be inspected to confirm proper operation of the closing device and latching device and that only the manufacturer's furnished fasteners are used for installation and that it meets all criteria of a fire door assembly per NFPA 80 (Standard for Fire Doors and Other Opening Protectives) 2016 Edition. A written record shall be maintained and transmitted to the Owner to be made available to the Authority Having Jurisdiction (AHJ). The inspection of the swinging fire doors shall be performed by a certified FDAI (Fire Door Assembly Inspector) with knowledge and understanding of the operating components of the type of door being subjected to the inspection. The record shall list each fire door assembly throughout the project and include each door number, an itemized list of hardware set components at each door opening, and each door location in the facility.

3.2 INSTALLATION

A. Install hardware in accordance with manufacturer's instructions and requirements of DHI.

B. Use the templates provided by hardware item manufacturer.

C. Mounting heights for hardware shall be as recommended by the Door and Hardware Institute. Operating hardware will to be located between 34" and 44" AFF.

D. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

E. Drill and countersink units that are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

F. Set thresholds for exterior doors in full bed of butyl-rubber sealant.

G. If hand of door is changed during construction, make necessary changes in hardware at no additional cost.

H. Hardware Installer shall coordinate with security contractor to route cable to connect electrified locks, panic hardware and fire exit hardware to power transfers or electric hinges at the time these items are installed so as to avoid disassembly and reinstallation of hardware.

I. Hardware Installer shall also be present with the security contractor when the power is turned on for the testing of the electronic hardware applications. Installer shall make adjustments to solenoids, latches, vertical rods and closers to insure proper and secure operation.

J. All wiring for electro-mechanical hardware mounted on the door shall be connected through the power transfer and terminated in the interface junction box specified for in the Electrical Section.

K. Conductors shall be minimum 18 gage stranded, multicolored. A minimum 12 in. loop of conductors shall be coiled in the interface junction box. Each conductor shall be permanently marked with its function.

L. If a power supply is specified in the hardware sets, all conductors shall be terminated in the power supply. Make all connections required for proper operation between the power supply and the electro-mechanical hardware. Provide the proper size conductors as specified in the manufacturer's technical documentation.

3.3 ADJUST AND CLEAN

A. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly as intended for the application made.

B. Clean adjacent surface soiled by hardware installation.

C. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy, return to that work area and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

D. Instruct Owner's Personnel in proper adjustment and maintenance of hardware finishes, during the final adjustment of hardware.

E. Continued Maintenance Service: Approximately six months after the completion of the project, the Contractor accompanied by the Architectural Hardware Consultant, shall return to the project and re-adjust every item of hardware to restore proper functions of doors and hardware. Consult with and instruct Owner's personnel in recommended additions to the maintenance procedures. Replace hardware items which have deteriorated or failed due to faulty design, materials or installation of hardware units. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware.

3.4 HARDWARE LOCATIONS

A. Conform to CCR, Title 24, Part 2; and ADAAG; and the drawings for access-compliant positioning requirements for the disabled.

3.5 FIELD QUALITY CONTROL

A. Contractor is responsible for providing the services of an Architectural Hardware Consultant (AHC) or a proprietary product technician to inspect installation and certify that hardware and its installation have been furnished and installed in accordance with manufacturers' instructions and as specified herein.

3.6 SCHEDULE

A. The items listed in the following schedule shall conform to the requirements of the foregoing specifications.

B. While the hardware schedule is intended to cover all doors, and other movable parts of the building, and establish type and standard of quality, the contractor is responsible for examining the Plans and Specifications and furnishing proper hardware for all openings whether listed or not. If there are any omissions in hardware groups in regard to regular doors they shall be called to the attention of the Architect prior to bid opening for instruction; otherwise, list will be considered Complete. No extras will be allowed for omissions.

C. The Door Schedule on the Drawings indicates which hardware set is used with each door.

Manufacturers Abbreviations (Mfr.)

GLY	=	Glynn-Johnson Corporation	Overhead Door Stops
IVE	=	Ives	Hinges, Bolts, Coordinators, Dust Proof Strikes, Push Pull & Protection Plates, Door Stops & Silencers
LCN	=	LCN	Door Closers & Magnetic Hold Opens
SCH	=	Schlage Lock Company	Locks, Latches & Cylinders
VON	=	Von Duprin	Exit Devices
ZER	=	Zero International	Thresholds, Gasketing & Weather-stripping

HARDWARE GROUP NO. 01

8	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	613	IVE
1	EA	PANIC HARDWARE	CDSI-PA-AX-9850WDC-L-DT-17-LBL-SNB	313_US 10B	VON
1	EA	PANIC HARDWARE	CDSI-PA-AX-9850WDC-L-KC-17-LBL-SNB	313_US 10B	VON
1	EA	RIM CYLINDER	20-057 ICX	613	SCH
2	EA	MORTISE CYLINDER	26-091 ICX XQ11-948	613	SCH
3	EA	INTERCHANGEABLE CORE	VERIFY PERMANENT CORE WITH OWNER	613	
2	EA	OH STOP	100S (ONLY @ LOCATIONS WHERE FS18S CAN'T BE USED)	613	GLY
2	EA	SURFACE CLOSER	4040XP EDA	695	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	613	IVE
2	EA	FLOOR STOP	FS18S	BLK	IVE
1	EA	RAIN DRIP	142D (OMIT WHERE OVERHANG OCCURS)	D	ZER
1	SET	MEETING STILE	328D-S	D	ZER
1	EA	GASKETING	488SBR PSA	BR	ZER
2	EA	DOOR SWEEP	39D	D	ZER
1	EA	THRESHOLD	PER DETAIL		

HARDWARE GROUP NO. 02 (ALTERNATIVE NON-ARCHED HEAD)

3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	613	IVE
1	EA	ELECTRIC HINGE	5BB1HW 4.5 X 4.5 CON TW8	613	IVE
1	EA	ELEC PANIC HARDWARE	RX-QELX-PA-AX-98-L-KC-17	313_US 10B	VON
1	EA	RIM CYLINDER	20-057 ICX	613	SCH
1	EA	INTERCHANGEABLE CORE	VERIFY PERMANENT CORE WITH OWNER	613	
1	EA	OH STOP	100S (ONLY @ LOCATIONS WHERE FS18S CAN'T BE USED)	613	GLY
1	EA	SURFACE CLOSER	4040XP EDA	695	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	613	IVE
1	EA	FLOOR STOP	FS18S	BLK	IVE
1	EA	RAIN DRIP	142D (OMIT WHERE OVERHANG OCCURS)	D	ZER
1	EA	GASKETING	188SBR PSA	BR	ZER
2	EA	DOOR SWEEP	39D	D	ZER
1	EA	THRESHOLD	PER DETAIL		
			CARD READER - WORK OF DIVISION 28		
			POWER SUPPLY - WORK OF DIVISION 28		
			DOOR CONTACT(S) - WORK OF DIVISION 28		

HARDWARE GROUP NO. 02 (ARCHED HEAD)

3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	613	IVE
1	EA	ELECTRIC HINGE	5BB1HW 4.5 X 4.5 CON TW8	613	IVE
1	EA	ELEC PANIC HARDWARE	RX-QELX-PA-AX-98-L-KC-17	313_US 10B	VON
1	EA	RIM CYLINDER	20-057 ICX	613	SCH
1	EA	INTERCHANGEABLE CORE	VERIFY PERMANENT CORE WITH OWNER	613	
1	EA	SURFACE CLOSER	4040XP CUSH ST-2480-2	695	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	613	IVE
1	EA	RAIN DRIP	142D (OMIT WHERE OVERHANG OCCURS)	D	ZER
1	EA	GASKETING	188SBR PSA	BR	ZER
2	EA	DOOR SWEEP	39D	D	ZER
1	EA	THRESHOLD	PER DETAIL		
			CARD READER - WORK OF DIVISION 28		
			POWER SUPPLY - WORK OF DIVISION 28		
			DOOR CONTACT(S) - WORK OF DIVISION 28		

HARDWARE GROUP NO. 03 (ALTERNATIVE NON-ARCHED HEAD)

3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	613	IVE
1	EA	ELECTRIC HINGE	5BB1HW 4.5 X 4.5 CON TW8	613	IVE
1	EA	EU MORTISE LOCK	LV9092TEU 17A RX CON 12/24 VDC	613	SCH
1	EA	INTERCHANGEABLE CORE	VERIFY PERMANENT CORE WITH OWNER	613	
1	EA	OH STOP	100S (ONLY @ LOCATIONS WHERE FS18S CAN'T BE USED)	613	GLY
1	EA	SURFACE CLOSER	4040XP EDA	695	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	613	IVE
1	EA	FLOOR STOP	FS18S	BLK	IVE
1	EA	RAIN DRIP	142D (OMIT WHERE OVERHANG OCCURS)	D	ZER
1	EA	GASKETING	188SBR PSA	BR	ZER
2	EA	DOOR SWEEP	39D	D	ZER
1	EA	THRESHOLD	PER DETAIL		
			CARD READER - WORK OF DIVISION 28		
			POWER SUPPLY - WORK OF DIVISION 28		
			DOOR CONTACT(S) - WORK OF DIVISION 28		

HARDWARE GROUP NO. 03 (ARCHED HEAD)

3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	613	IVE
1	EA	ELECTRIC HINGE	5BB1HW 4.5 X 4.5 CON TW8	613	IVE
1	EA	EU MORTISE LOCK	LV9092TEU 17A RX CON 12/24 VDC	613	SCH
1	EA	INTERCHANGEABLE CORE	VERIFY PERMANENT CORE WITH OWNER	613	
1	EA	SURFACE CLOSER	4040XP CUSH ST-2480-2	695	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	613	IVE
1	EA	RAIN DRIP	142D (OMIT WHERE OVERHANG OCCURS)	D	ZER
1	EA	GASKETING	188SBR PSA	BR	ZER
2	EA	DOOR SWEEP	39D	D	ZER
1	EA	THRESHOLD	PER DETAIL		
			CARD READER - WORK OF DIVISION 28		
			POWER SUPPLY - WORK OF DIVISION 28		
			DOOR CONTACT(S) - WORK OF DIVISION 28		

HARDWARE GROUP NO. 04

8	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	613	IVE
1	EA	CONST LATCHING BOLT	FB51P 48"	US10B	IVE
1	EA	DUST PROOF STRIKE	DP1	613	IVE
1	EA	STOREROOM LOCK	LV9080T 17A	613	SCH
1	EA	INTERCHANGEABLE CORE	VERIFY PERMANENT CORE WITH OWNER	613	
1	EA	COORDINATOR	COR X FL	711	IVE
2	EA	MOUNTING BRACKET	MB	BLK	IVE
2	EA	OH STOP	100S (ONLY @ LOCATIONS WHERE FS18S CAN'T BE USED)	613	GLY
2	EA	SURFACE CLOSER	4040XP EDA	695	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	613	IVE
2	EA	FLOOR STOP	FS18S	BLK	IVE
1	EA	GASKETING	188SBR PSA	BR	ZER
2	EA	DOOR SWEEP	39D	D	ZER
1	EA	MEETING STILE	44STST OR BY HMD MFR	STST	ZER
1	EA	THRESHOLD	PER DETAIL		

HARDWARE GROUP NO. 05

4	EA	HINGE	5BB1 4.5 X 4.5	640	IVE
1	EA	PANIC HARDWARE	PA-AX-98-L-17	313_US 10B	VON
1	EA	RIM CYLINDER	20-057 ICX	613	SCH
1	EA	INTERCHANGEABLE CORE	VERIFY PERMANENT CORE WITH OWNER	613	
1	EA	SURFACE CLOSER	4040XP RW/PA (MOUNT PUSH SIDE)	695	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	613	IVE
1	EA	WALL STOP	WS401/402CCV	613	IVE
1	EA	GASKETING	188SBR PSA	BR	ZER

HARDWARE GROUP NO. 06

4	EA	HINGE	5BB1 4.5 X 4.5	640	IVE
1	EA	PANIC HARDWARE	PA-AX-98-L-17	313_US 10B	VON
1	EA	RIM CYLINDER	20-057 ICX	613	SCH
1	EA	INTERCHANGEABLE CORE	VERIFY PERMANENT CORE WITH OWNER	613	
1	EA	SURFACE CLOSER	4040XP RW/PA (MOUNT PUSH SIDE)	695	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	613	IVE
1	EA	MAGNET	SEM7850 12V/24V/120V	695	LCN
1	EA	GASKETING	188SBR PSA	BR	ZER

HARDWARE GROUP NO. 07

3	EA	HINGE	5BB1 4.5 X 4.5	640	IVE
1	EA	ELECTRIC HINGE	5BB1 4.5 X 4.5 CON TW8	613	IVE
1	EA	EU MORTISE LOCK	LV9092TEU 17A RX CON 12/24 VDC	613	SCH
1	EA	INTERCHANGEABLE CORE	VERIFY PERMANENT CORE WITH OWNER	613	
1	EA	SURFACE CLOSER	4040XP RW/PA (MOUNT PULL SIDE)	695	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	613	IVE
1	EA	FLOOR STOP	FS436/FS438 AS REQ.	613	IVE
1	EA	GASKETING	188SBR PSA	BR	ZER
			CARD READER - WORK OF DIVISION 28		
			POWER SUPPLY - WORK OF DIVISION 28		
			DOOR CONTACT(S) - WORK OF DIVISION 28		

HARDWARE GROUP NO. 08

4	EA	HINGE	5BB1 4.5 X 4.5	640	IVE
1	EA	OFFICE/ENTRY LOCK	L9050T 17A L583-363	613	SCH
1	EA	INTERCHANGEABLE CORE	VERIFY PERMANENT CORE WITH OWNER	613	
1	EA	SURFACE CLOSER	4040XP RW/PA (MOUNT PULL SIDE)	695	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	613	IVE
1	EA	WALL STOP	WS401/402CCV	613	IVE
1	EA	GASKETING	188SBR PSA	BR	ZER

HARDWARE GROUP NO. 09

4	EA	HINGE	5BB1 4.5 X 4.5	640	IVE
1	EA	PRIVACY W/INDICATOR	L9056T 17A L583-363	613	SCH
1	EA	INTERCHANGEABLE CORE	VERIFY PERMANENT CORE WITH OWNER	613	
1	EA	SURFACE CLOSER	4040XP RW/PA (MOUNT PULL SIDE)	695	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	613	IVE
1	EA	MOP PLATE	8400 4" X 2" LDW B-CS	613	IVE
1	EA	WALL STOP	WS401/402CCV	613	IVE
1	EA	GASKETING	188SBR PSA	BR	ZER

HARDWARE GROUP NO. 10

4	EA	HINGE	5BB1HW 4.5 X 4.5	640	IVE
1	EA	PUSH PLATE	8200 6" X 16"	613	IVE
1	EA	PULL PLATE	8302 10" 4" X 16"	613	IVE
1	EA	SURFACE CLOSER	4040XP RW/PA (MOUNT PULL SIDE)	695	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	613	IVE
1	EA	MOP PLATE	8400 4" X 2" LDW B-CS	613	IVE
1	EA	WALL STOP	WS401/402CCV	613	IVE
1	EA	GASKETING	188SBR PSA	BR	ZER

HARDWARE GROUP NO. 11

4	EA	HINGE	5BB1 4.5 X 4.5	640	IVE
1	EA	ACCESSIBLE STOREROOM LOCK	L9081T 17A	613	SCH
1	EA	INTERCHANGEABLE CORE	VERIFY PERMANENT CORE WITH OWNER	613	
1	EA	SURFACE CLOSER	4040XP SCUSH	695	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	613	IVE
1	EA	GASKETING	188SBR PSA	BR	ZER

HARDWARE GROUP NO. 12

8	EA	HINGE	5BB1 4.5 X 4.5	640	IVE
1	EA	CONST LATCHING BOLT	FB51T 48"	US10B	IVE
1	EA	ACCESSIBLE STOREROOM LOCK	L9081T 17A	613	SCH
1	EA	INTERCHANGEABLE CORE	VERIFY PERMANENT CORE WITH OWNER	613	
1	EA	SURFACE CLOSER	4040XP RW/PA (MOUNT PUSH SIDE AND ACTIVE LEAF ONLY)	695	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	613	IVE
2	EA	WALL STOP	WS401/402CCV	613	IVE
1	EA	MEETING STILE	44STST	STST	ZER
2	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 13

8	EA	HINGE	5BB1 4.5 X 4.5	640	IVE
1	EA	CONST LATCHING BOLT	FB51T 48"	US10B	IVE
1	EA	ACCESSIBLE STOREROOM LOCK	L9081T 17A	613	SCH
1	EA	INTERCHANGEABLE CORE	VERIFY PERMANENT CORE WITH OWNER	613	
1	EA	OH STOP	90S (INACTIVE LEAF)	613	GLY
1	EA	SURFACE CLOSER	4040XP CUSH (ACTIVE LEAF)	695	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	613	IVE
1	EA	MEETING STILE	44STST	STST	ZER
2	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 14

2	EA	HINGE	5BB1 4.5 X 4.5	640	IVE
1	EA	PASSAGE SET	L9010 17A	613	SCH
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	613	IVE
1	EA	WALL STOP	WS401/402CCV	613	IVE

HARDWARE GROUP NO. 15

HARDWARE BY DOOR MFR.

END OF SECTION 08 71 00

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SECTION 08 80 00

GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes

1. Glass for windows.
2. Glazing sealants and accessories.

B. Related Requirements:

1. Section 08 11 13, "Hollow Metal Doors, Borrowed Lites and Frames."
2. Section 08 52 13, "Aluminum-Clad Wood Windows."

1.3 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

1.4 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

C. IBC: International Building Code.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

1.6 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.7 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review temporary protection requirements for glazing during and after installation.

1.8 ACTION SUBMITTALS

A. Product Data: For each type of product, including specialty films.

1.9 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For glass.

C. Sample Warranties: For special warranties.

1.10 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

B. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

C. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.12 FIELD CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F (4.4 deg C).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.

B. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

2.2 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; deterioration of glazing materials; or other defects in construction.

2.3 GLASS PRODUCTS

A. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear), Quality-Q3.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

B. Tempered Architectural Safety Glass:

1. All tempered architectural safety glass shall conform with ANSI Z97.1 and CPSC 16 CFR 1201.
2. For all fully tempered glass, provide heat soak testing conforming to EN14179 which includes a 2 hour dwell at 290°C±10°C.

C. Laminated Glass: ASTM C 1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.

1. Construction: Laminate glass with PVB interlayers to comply with interlayer manufacturer's written recommendations.

2.4 GLASS TYPES

A. General: All glass lites for all glass types to be fully tempered.

B. GL-01: Insulated, clear, Low-E, argon filled.

1. Outboard Glass Ply: 1/4 inch (6 mm) thick, clear, with "Solarban 70" low-E coating on the #2 surface.
2. Spacer Frame: "Endur IG" spacer frame by Cardinal Glass, or equal.

a. Gap: 1/2 inch, 90% argon filled.

3. Inboard Glass Ply: 1/4 inch (6 mm) thick, clear.
4. Overall Unit Thickness: 1-inch.
5. Minimum Assembly Performance Properties:

a. Visible Light Transmittance:

1) Minimum 70 percent.

b. Solar Heat-Gain Coefficient (SHGC)/Shading Coefficient and U-factor (Winter and Summer) shall be as determined by Performance Compliance based Energy Modeling, per California Building Energy Efficiency Standards, Title 24, Chapter 6, Subchapter 5.

1) U-factor: 0.25.
2) SHGC: 0.37.

C. GL-02: 1/4 inch clear tempered float, in locations as indicated and as required by code.

D. GL-03: 1/2 inch clear tempered float, in locations as indicated and as required by code.

E. GL-04: Windscreen System; see keynote 5 on drawing A103, "Enlarged Patio Site Plan & Details and Drawing A103, "Enlarged Patio Site Plan and Details."

1. Laminated Glass:

a. Lamination Sequence (typical Unless Otherwise Noted):

1) Glass Ply: 1/4” Clear, Heat Treatment – FT.
2) Interlayer: PVB Interlayer (thickness per performance requirements).
3) Glass Ply: 1/4” Clear, Heat Treatment – FT.

b. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.

1) Single Interlayer Thickness: 0.030". Additional interlayers to be added as required to achieve specified color.

2) Interlayer Colors: Provide clear PVB layers unless otherwise indicated.

2.5 GLAZING SEALANTS

A. General:

1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

2.6 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.7 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.8 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until right before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 CLEANING AND PROTECTION

A. Immediately after installation remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.

1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

C. Remove and replace glass that is damaged during construction period.

D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 08 80 00

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SECTION 09 24 00

CEMENT PLASTERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Exterior Portland cement plasterwork (stucco) on metal lath in the following locations:

   a. Walls.
   b. Soffits.

2. System Decsription:

   a. A code complying water resistive barrier composed of metal lath, Fastwall Stucco Base, Parex USA reinforcing mesh embedded in Parex USA Stucco Level Coat, and an elastomeric based finish coat.

3. Metal Stucco Accessories:

   a. Typical Lath at Walls: Precision welded 17 ga. galvanized steel wire to form 1 ½" x 1 ½" openings.
   b. Lath at Soffits: Self-furring galvanized steel welded wire lath produced from cold-rolled rectangular longitudinal wires and round cross wires with rectangular openings 0.7-inches x 1 1/2-inches.
   c. Accessories: Control joints, two-piece expansion joints, casing beads, weep screed, soffit vents, etc.

4. Exterior Trim Accessories:

   a. Specialty surface top-coatings applied over reinforced, expanded polystyrene (EPS) cellular foam core shapes.

      1) Basis of Design: coated expanded polystyrene (EPS) architectural foam moldings by Monterey Foam Company, Inc., P.O. Box 28365, San Jose, CA 95159-8365; 408-279-6756, fax: 408-279-1633; www.montereyfoam.com.

5. Tile Vents:

   a. 3-hole, round decorative tile vents with terracotta finish.

B. Related Requirements:

1. Section 09 90 00, “Painting and Coating."
2. Section 07 25 00, “Weather Resistive Barriers."
3. Section 07 62 00, "Sheet Metal Flashing and Trim."

1.3 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver LaHabra FastWall 100 Stucco Assembly products in original packaging with manufacturer's identification.

B. Storage: Store LaHabra FastWall 100 Stucco Assembly products in a dry location, out of direct sunlight, off the ground, and protected from moisture.

1.6 PROJECT CONDITIONS

A. Comply with ASTM C 926 requirements.

B. Substrate Temperature: Do not apply LaHabra products to substrates whose temperature are below 40 F (4.4 C) or contain frost or ice.

C. Inclement Weather: Do not apply LaHabra products during inclement weather, unless appropriate protection is employed.

D. Sunlight Exposure: Avoid, when possible, installation of the LaHabra products in direct sunlight. Application of LaHabra Finishes in direct sunlight in hot weather may adversely affect aesthetics.

E. Do not apply stucco base coats or finishes if ambient temperature falls below 40ºF (4ºC) within 24 hours of application. Protect stucco from uneven and excessive evaporation during dry weather and strong blasts of dry air.

F. Prior to installation, the wall shall be inspected for surface contamination, or other conditions that may adversely affect the performance of the LaHabra Fastwall 100 Stucco Assembly, and shall be free of residual moisture.

1.7 COORDINATION AND SCHEDULING

A. Coordination: Coordinate LaHabra Fastwall 100 Stucco Assembly installation with other construction operations.

1.8 PERFORMANCE REQUIREMENTS:

Fastwall	**Method**	**ICC AC 11 Criteria**	**Results**
Accelerated Weathering	ASTM G153	2000 Hours	No deleterious effect
Freeze-Thaw Resistance	ICC AC 11	10 cycles	Pass
Transverse Wind Load Resistance	ASTM E330	Meet Design Loads	Refer to ICC-ES ESR-2564
Fire Resistance	ASTM E119	One hour fire	Refer to ICC-ES ESR-2564
Drainage	ICC AC 11	90%	Refer to ICC-ES ESR-2564
Acrylic Finish	**Method**	**ICC or ASTM Criteria**	**Results**
Accelerated Weathering	ASTM G153 (ASTM G 23) ASTM G154	No deleterious effects at 2000 hours when viewed under 5x magnification	2000 Hours: no deleterious effect
Freeze/Thaw Resistance	ASTM E2485	No deleterious effects at 10 cycles when viewed under 5x magnification	60 cycles: no deleterious effect
Fungus Resistance	MIL STD 810B	No Requirement	28 days: no growth
Mildew Resistance	ASTM D3273	No growth supported during 28 day exposure period	Pass
Moisture Resistance	ASTM D2247	No deleterious effects at 14 day exposure	Pass
Salt Fog Resistance	ASTM B117	No deleterious effects at 300 hours	500 hours: no deterioration

1.9 WARRANTY

A. Warranty: Upon request, at completion of installation, provide Standard Limited LaHabra Fastwall 100 Stucco Assembly Warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer: Parex USA, Inc., 4125 E. La Palma Ave., Suite 250, Anaheim, CA 92807.

B. Components: Obtain components manufactured by Parex USA of LaHabra Fastwall 100 Stucco Assembly from authorized distributors. No substitutions or additions of other materials are permitted without prior written permission from Parex USA for this project.

2.2 MATERIALS

A. LaHabra Fastwall 100 Stucco Assembly Materials:

1. LaHabra Fastwall 100 Stucco Base (⅜ in – ½ in).

a. LaHabra Fastwall Stucco Base Concentrate: Proprietary mixture of portland cement, and proprietary ingredients mixed with clean, cool, potable water, and ASTM C897 or ASTM C144 sand added in the field.

2. Leveling and Reinforcing Coat:

a. Parex USA Stucco Level Coat: Copolymer based, factory blend of cement and proprietary ingredients requiring addition of water.
b. Parex USA 355 Standard Mesh: Weight 4.5 oz/sq.yd. reinforcing mesh.

3. Finish Coat:

a. Perma-Flex Stucco Grade Acrylic Finish: Factory blended, 100% acrylic polymer based finish, integrally colored.

4. Exterior Plaster Trim Accessories:

a. Fabricated expanded polystyrene (EPS) rigid, closed-cell insulation material, white, with Class 1 flame spread rating (25 or less), minimum average density of 1.0 psf except as otherwise indicated on the Drawings, and meeting requirements of ASTM C578 and EIMA "Guideline Specification for Expanded Polystyrene (EPS) Insulation Board."
b. Manufacturer: Patterson Whittaker, 2716 Eastlake Avenue East, Seattle, WA 98102; Sales Rep: Karri Anderson (206-953-5209; karri@pwprofiles.com).
c. Foam shall be factory prepared with reinforcing mesh bonded to foam in a base coat and ready to receive finish of cement plaster.
d. Thickness and Profiles: Hot wire cut in shop to profiles indicated on the Drawings.
e. At window or sills of openings or where shapes have a "horizontal" surface, provide shapes with double mesh layer and double base coat.
f. Foam shall not contain chlorofluorocarbons (CFC).
g. Adhesive: Polymer modified portland cement-based adhesive and base coat for foam shapes.

1) LaHabra Poly-Bond by LaHabra.

2.3 EXPANSION AND CONTROL JOINTS

A. Expansion and Control Joints: Continuous expansion and control joints shall be installed at locations in accordance with ASTM C1063 and ASTM C926.

1. Substrate movement, and expansion and contraction of LaHabra FastWall 100 Stucco and adjacent materials shall be taken into account in design of expansion joints, with proper consideration given to sealant properties, installation conditions, temperature range, coefficients of expansion of materials, joint width to depth ratios, and other material factors. Minimum width of expansion joints shall be as specified by the designer or shown on the project drawings.

2. In accordance with ASTM C1063, expansion or control joints shall be installed in walls not more than 144 sq.ft. in area, and not more than 100 sq.ft. in area for all non-vertical applications. The distance between joints shall not exceed 18 ft in either direction or a length-to-width ratio of 2-½ to 1.
3. For direct appliaction to concrete or masonry, stucco joints are requried only at control/expansion joints in the underlaying concrete or masonry.

2.4 METAL LATH

A. Wire-Fabric Lath:

1. Welded-Wire Lath at Typical Conditions: ASTM C 933; self-furring, 1.00 lb/sq. yd. "Structalath III", 1-1/2-inch x 1-1/2-inch, by Structu Wire Corp., 1395 North Grandview Hwy., Vancouver, BC V5N 1N2; 604-254-9868; info@structawire.com.
2. Lath at Soffits: ASTM C 933; self-furring, 2.21 lb/sq. yd. "V-Truss Walls and Ceilings Lath II", 0.7-inch x 1-1/2-inch, by Structu Wire Corp., 1395 North Grandview Hwy., Vancouver, BC V5N 1N2; 604-254-9868; info@structawire.com.

2.5 ACCESSORIES

A. General: Comply with ASTM C 1063 and coordinate depth of trim and accessories with thicknesses and number of plaster coats required.

B. Metal Accessories:

1. Foundation Weep Screed: Fabricated from hot-dip galvanized-steel sheet, ASTM A 653/A 653M, G60 (Z180) zinc coating.
2. Cornerite: Fabricated from metal lath with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized zinc coating.
3. External-Corner Reinforcement: Fabricated from metal lath with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized zinc coating.
4. Soffit Drip Edge:

    a. CEMCO #12.

5. Cornerbeads: Fabricated from zinc-coated (galvanized) steel.

    a. Small nose cornerbead with expanded flanges; use unless otherwise indicated.

6. Casing Beads:

    a. Type 1, Standard: Fabricated from zinc-coated (galvanized) steel; square-edged style; with expanded flanges.
    b. Type 2, in head locations above hollow metal doors: vinyl casing bead w/ weep holes.

7. Control Joints: Fabricated from zinc-coated (galvanized) steel; one-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.
8. Expansion Joints: Fabricated from zinc-coated (galvanized) steel; folded pair of unperforated screeds in M-shaped configuration; with expanded flanges.

9. Two-Piece Expansion Joints: Fabricated from zinc-coated (galvanized) steel; formed to produce slip-joint and square-edged reveal that is adjustable from 1/4 to 5/8 inch (6.34 to 16 mm) wide; with perforated flanges.
10. Corner Lath Patch: Provide reinforcing lath patch at all corners of door and window openings in cement plaster walls, typical.

    a. Product: Cemco 6-inch x 18-inch 2.5 diamond lath patch; 26 gauge galvanized steel with standard G60 coating.

C. Tile Vents:

1. 3-hole, round decorative tile vents with terracotta finish:

    a. 20-inch x 19-inch tile vents with three 5 1/4-inch diameter holes; model HDTV3R2019 by Volterra Architectural Products, 1902 North 22nd Avenue, Phoenix, AZ 85009; 602-258-7373.

D. Exterior Trim Accessories:

    a. Specialty surface top-coatings applied over reinforced, expanded polystyrene (EPS) cellular foam core shapes.

        1) Basis of Design: coated expanded polystyrene (EPS) architectural foam moldings by Monterey Foam Company, Inc., P.O. Box 28365, San Jose, CA 95159-8365; 408-279-6756, fax: 408-279-1633; www.montereyfoam.com.

2.6 MISCELLANEOUS MATERIALS

A. Water for Mixing: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

1. Substrate shall be of a type approved by Parex USA. Plywood substrates shall be gapped 1/8 in at all edges.
2. Substrate shall be examined for soundness, and other harmful conditions.
3. Substrate shall be free of dust, dirt, laitance, efflorescence, and other harmful contaminants.
4. Substrate construction in accordance with substrate material manufacturer's specifications and applicable building codes.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Ensure that flashing has been installed per Specification Section 07 60 00, "Flashing and Sheet Metal."

D. Penetration Flashing:

1. Plumbing and electrical penetrations that occur through the cement plaster assembly shall be sealed and flashed with QuickFlash Weatherproofing Products, 4129 Wagon Trail Ave., Las Vegas, NV (702) 614-6100.
2. Other penetrations that occur through the cement plaster assembly shall be sealed and flashed with self-adhering flashing prior to the application of lath. Self-adhering flashing shall be cut to conform to the penetrating object. Where penetrating objects incorporate flashing collars, lap weather resistant barrier and self-adhering flashing over top of flashing collar and extend a minimum of 3 inches at sides. Lap self-adhering flashing and a piece of weather resistant barrier under flashing collar at bottom and extend a minimum of 3 inches at sides.

3.2 PREPARATION

A. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.

B. Prepare solid substrates for plaster that are smooth or that do not have the suction capability required to bond with plaster according to ASTM C 926.

C. Metal Lath: Install according to ICC Evaluation Report ESR 2564, ASTM C1063 and Appendix and the Building Code.

D. Reinforcement for External Corners:

1. Install lath-type, external-corner reinforcement at exterior locations.

E. Control Joints: Install control joints at locations indicated on Drawings.

F. Install self-adhering flashing behind all control joints and expansion joints.

G. Install Shaped Expanded Polystyrene as indicated on the Drawings.

3.3 MIXING

A. Mix LaHabra proprietary products in accordance with manufacturer's instructions, including the applicable LaHabra Fastwall 100 Stucco Assembly Product Data Sheets.

3.4 APPLICATION

A. General: LaHabra Fastwall 100 Stucco Assembly and its related materials shall conform to the requirements of ICC-ES Evaluation Report No. 2564 and shall conform to this specification.

B. LaHabra Fastwall Stucco Base:

1. LaHabra Fastwall Stucco mixtures shall be applied in one or two coats to a minimum thickness of 3/8 in by hand troweling or machine spraying the mixture to the wire lath in accordance with LaHabra Fastwall Stucco Product Data Sheets. The maximum thickness applied in one pass is 1/2 in.
2. Rod surface to true plane and float to densify.
3. Trowel to smooth and uniform surface to receive acrylic polymer finish coat.

C. Leveling and Reinforcing Coat (LaHabra Fastwall 100 Krak-Shield Stucco Assembly):

1. After Moist Curing, allow LaHabra Fastwall Stucco Base to air dry a minimum of 24 hours before applying the leveling and reinforcing coat.
2. Using a stainless steel trowel, apply the LaHabra Stucco Level Coat over the LaHabra Fastwall Stucco Base at a thickness of 1/16 - 3/32 in.
3. Fully embed the Parex USA Standard Mesh into the wet Stucco Level Coat including diagonal strips at corners of openings and trowel smooth. If Standard Mesh is used, seams are overlapped 2-1/2 in.
4. The LaHabra acrylic primer and finishes can be applied as soon as the LaHabra Stucco Level Coat has cured, typically within 24 hours.

D. Patterson Whittaker Expanded Polystyrene Featured over LaHabra Fastwall Stucco Base:

1. Install back-wrap mesh at EPS terminations.
2. Apply LaHabra adhesive to backs of insulation boards with a notched trowel. Allow to dry a minimum of 12 hours.
3. Apply LaHabra Base coat to the entire foam shape and pull the backwrap mesh around the foam shapes and fully embed it into the base coat.
4. Immediately embed the reinforcing mesh in the wet LaHabra Base coat.

E. LaHabra Primer and Finish:

1. Remove surface contaminants such as dust or dirt without damaging the substrate.
2. Ambient and surface temperature must be 40°F or higher during application and drying time. Supplemental heat and protection from precipitation must be provided as needed.
3. Use only on surfaces that are sound, clean, dry, unpainted, and free from any residue that might affect the ability of the finish to bond to the surface.
4. LaHabra FastWall 100 Stucco Assembly:

    a. After Moist curing, allow the LaHabra FastWall Stucco Base to air dry.

        1) Minimum of 5 additional days before application of Elastomeric based Finish Coat.

5. Protect LaHabra Finish Coats from inclement weather until completely dry.

F. Curing:

1. LaHabra Fastwall Stucco Base: Keep stucco moist for at least 48 hours (longer in dry weather) by lightly fogging walls. Start light fogging after initial set of 1-2 hours.
2. Air dry elastomeric finish coats only, do not wet cure.

G. Thin Brick Veneer:

1. See specification Section 04 21 13, "Thin Brick Veneer."

3.5 PLASTER REPAIRS

A. Repair or replace work to eliminate cracks, dents, blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.

3.6 CLEAN-UP

A. Removal: Remove and legally dispose of LaHabra Fastwall 100 Stucco component debris material from job site.

B. Clean exposed surfaces using materials and methods recommended by the manufacturer of the material or product being cleaned. Remove and replace work that cannot be cleaned to the satisfaction of the Owner.

3.7 PROTECTION

A. Remove temporary protection and enclosure of other work. Promptly remove plaster from door frames, windows, and other surfaces not indicated to be plastered. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged during plastering.

B. Provide protection of installed materials from water infiltration into or behind them.

C. Provide protection of installed stucco from dust, dirt, precipitation, and freezing during installation.

D. Provide protection of installed finish from dust, dirt, precipitation, freezing, and continuous high humidity until fully dry.

END OF SECTION 09 24 00

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SECTION 09 29 00

GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Interior gypsum board.

B. Related Requirements:

1. Section 06 10 00, "Rough Carpentry."
2. Section 07 92 00, "Joint Sealants."
3. Section 08 31 00, "Access Doors and Frames,"

1.3 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

1.4 ACTION SUBMITTALS

A. Product Data: Manufacturer's product data for the following system materials suitable to show compliance with requirements.

1. Each type of gypsum board and finishing product.
2. Trim accessories.
3. Metal accessories.

1.5 QUALITY ASSURANCE

A. Industry Standards: Work shall comply with the applicable requirements of GA publication GA-216 and GA-214.

B. Installer Qualifications: Company specializing in work similar to that required on this Project, with not less than 5 years of documented experience.

C. Notify Architect prior to covering or enclosing framing, ducts, and pipes in sound-rated construction in order to allow for on-site review and correction as required.

1.6 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage.

B. Stack panels flat and supported on risers on a flat platform to prevent sagging.

C. Store metal accessories so as to prevent bending, sagging, distortion, or other mechanical damage.

D. Comply with additional requirements specified in Section 01 60 00, "Product Requirements."

1.7 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.

2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration

PART 2 - PRODUCTS

2.1 DESIGN AND PERFORMANCE CRITERIA

A. Fire-Resistance Ratings:

1. Comply with fire-resistance ratings as indicated and required by governing authorities and codes.
2. Provide materials, accessories, and application procedures that have been listed by a nationally recognized testing agency or tested according to ASTM E 119 for type of construction shown.

B. Comply with the CBC.

2.2 INTERIOR GYPSUM BOARD

A. Fire-Rated Moisture- and Mold-Resistant Board: USG Corporation, LLC, "USG Sheetrock Brand EcoSmart Panels Mold Tough Firecode X," or equal.

1. ASTM C 1396, Type X.
2. Thickness: 5/8 inch.
3. Mold Resistance (ASTM D 3273): Meet or exceed ASTM C 1396 specifications.
4. Moisture Resistance: The average water absorption for panels shall not exceed 5 percent by weight after two-hour immersion when tested in accordance with ASTM C 473.

B. Glass-Mat Interior Gypsum Board for Tile Substrate: ASTM C 1658/C 1658M. With fiberglass mat laminated to both sides. USG Corporation, LLC, "Securock Brand Glass Mat Firecode X Sheathing."

1. Core: 5/8 inch (15.9 mm), Type X.
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

C. Sound Reducing Gypsum Panel: "QuietRock ES (EZ-SNAP)" by Pabco Gypsum.

1. ASTM C 1396, Type X.
2. Thickness: 5/8 inch.
3. Long Edges: Tapered.
4. STC Rated Assemblies (ASTM E 90): 48-60.
5. Acoustically rated sealant accessories: "QuietSeal Pro" and "QuietPutty" by Pabco Gypsum.

2.3 TRIM ACCESSORIES

A. Interior Trim: Electrogalvanized concealed metal reinforcements and casing, conforming to ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.
2. Shapes:

    a. Exterior Corner: United States Gypsum (USG) "Dur-A-Bead," Casings Western No. 220, or equal.
    b. Intersection of Gypsum Board with Dissimilar Material: USG No. 200-B "L" shaped trim and 200-A "J" shaped trim, Casings Western, or equal.
    c. Control Joint: USG No. 093 or equal.
    d. Interior Trim at Louvers and Storefront Windows: metal J-trim #400 by ClarkDietrich.

B. Exposed Reveals and Moldings:

1. Manufacturer: Fry Reglet Corp. as specified, or accepted equal.

2. Material: Extruded aluminum with manufacturer's factory-applied silicone polyester finish applied over conversion coating and primer.

   a. Colors: White, unless otherwise noted.

3. Profiles: As indicated on the Drawings:

   a. W-reveal.
   b. F-reveal.

2.4 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Exterior Gypsum Soffit Board: Paper.

C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.

   a. Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For second coat, use setting-type, sandable topping compound.
4. Finish Coat: For third coat, use setting-type, sandable topping compound.

D. Joint Compound for Tile Backing Panels:

1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.

2.5 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

1. Laminating adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.7 FINISHES

A. Match existing gypsum board finish.

2.8 AUXILLARY MATERIALS

A. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

B. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

C. Sound-Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

D. Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Acoustical joint sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.

    a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

B. Double-Layer Application:

1. Apply base layer vertically, offsetting vertical joints at least one stud space between layers.
2. Install base layer by means of screw attachment.
3. Provide fire taping only.
4. Precut and fit face layer by laminating to base layer with adhesive.
5. Provide temporary support for face layer, by fasteners or shoring, until adhesive is dry.
6. At Contractor's option, provide permanent support by attaching face layer to base layer with screws in accordance with manufacturer's instructions.

C. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

D. Curved Surfaces:
1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12-inch- (300-mm-) long straight sections at ends of curves and tangent to them.
2. For double-layer construction, fasten base layer to studs with screws 16 inches (400 mm) O.C. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches (300 mm) O.C.

3.4 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints at locations indicated on Drawings.

C. Interior Trim: Install in the following locations:

1. External Corners: Apply metal corner beads at external corners in single lengths, unless details clearly indicate its omission at specific locations.
2. Exposed panel edges: LC-Bead:
3. Apply "L" or "J" trim at all exterior corners and at interior corners where gypsum board intersects window or storefront mullion, concrete, or other dissimilar material.
4. Install in longest lengths practicable.
5. Run trim straight and square with all planes.
6. Control Joints:

a. Provide control joints in accordance with ASTM C840 recommendations and where otherwise shown and specified.

1) Walls: Provide where areas are 30 feet or more in either direction.
2) Ceilings: Provide to divide into areas not exceeding 2,500 square feet and at not more than 50 feet on center.

b. Where not shown, locate as approved by Architect.
c. Partitions: Back with double studs.

7. Edges:

a. Apply applicable shape of metal edge trim at exposed edges of wallboard and where otherwise shown.
b. Gypsum Board Abutting Other Materials: Install edge trim with 1/8-inch clearance to allow for sealant.
c. Gypsum Board Abutting Concrete: Install edge trim with 1/4-inch clearance to allow for sealant.

3.5 FIELD QUALITY CONTROL

A. Construction Tolerances:

1. Gypsum board surfaces to be painted shall have no measurable variation in any 2-foot direction and a maximum variation of 1/8 inch in 10 feet 0 inches when a straightedge is laid on the surface in any direction.
2. Shim work as required to comply with specified tolerances.
3. Do not exceed 1/16-inch offset between planes of abutting sheets at edges or ends.

3.6 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

1. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.

a. Primer and its application to surfaces are specified in Section 09 91 23 "Interior Painting."

3.7 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 29 00

SECTION 09 30 00

TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Ceramic tile.
2. Waterproof and crack isolation membrane.
3. Crack isolation membrane.

B. Related Sections:

1. Section 07 92 00, "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
2. Section 09 29 00, "Gypsum Board" for glass-mat, water-resistant backer board.

1.3 DEFINITIONS

A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.

B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in "American National Standard Specifications for Installation of Ceramic Tile."

C. Module Size: Actual tile size plus joint width indicated.

D. Face Size: Actual tile size, excluding spacer lugs.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1. Full-size units of each type and composition of tile and for each color and finish required.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

1.6 QUALITY ASSURANCE

A. Source Limitations for Tile: Obtain tile of each type and color or finish from one source or producer.

1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.

B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from one manufacturer and each aggregate from one source or producer.

C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer for each product:

1. Waterproof membrane.
2. Crack isolation membrane.
3. Joint sealants.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

D. Store liquid materials in unopened containers and protected from freezing.

E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

1. Provide tile complying with Standard grade requirements unless otherwise indicated.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCA installation methods specified in tile installation schedules, and other requirements specified.

C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.

2.2 TILE PRODUCTS

A. Provide products as designated on the Drawings. See Drawing A304, "Finish Schedule":

1. Floor Tile designation **T-1**:

a. Manufacturer: Richards & Sterling.
b. Style/Finish: Cocci Siciliani.

2. Floor Tile designation **T-2**:

a. Manufacturer: Crossville.
b. Style/Finish: Stone Fiction.

3. Coved Tile Base designation **B-2**:

a. Manufacturer: Crossville.
b. Style/Finish: Stone Fiction.

4. Wall Tile designation **T-3**:

a. Manufacturer: Bedrosians.
b. Style/Finish: Marin.

2.3 WATERPROOF MEMBRANE

A. General: Manufacturer's standard product, selected from the following that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

2.4 CRACK ISOLATION MEMBRANE

A. General: Manufacturer's standard product, that complies with ANSI A118.12 for standard performance and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

2.5 SETTING MATERIALS

A. Dry-Set Portland Cement Mortar (Thin Set): ANSI A118.1.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Laticrete International, Inc.
   b. Custom Building Products

2. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.1.

B. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Custom Building Products.
   b. Laticrete International, Inc.

2. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.

2.6 GROUT MATERIALS

A. Polymer-Modified Tile Grout: ANSI A118.7.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Custom Building Products.
   b. Laticrete International, Inc.

2.7 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

B. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

C. Grout Sealer: Manufacturer's standard silicone product for sealing grout joints and that does not change color or appearance of grout.

1. Products: Subject to compliance with requirements, [provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]:

a. Custom Building Products
b. Southern Grouts & Mortars, Inc.; Silicone Grout Sealer.

2.8 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
2. Verify that concrete substrates for tile floors installed with thin-set mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.

a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.

3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot (1:50) toward drains.

C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

D. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.3 TILE INSTALLATION

A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

1. For the following installations, follow procedures in the ANSI A108 Series of tile installation standards for providing 95 percent mortar coverage:

    a. Tile floors in wet areas.
    b. Tile floors composed of tiles 8 by 8 inches (200 by 200 mm) or larger.

B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.

E. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.

F. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

G. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

H. Grout Sealer: Apply grout sealer to grout joints in tile floors according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.4 WATERPROOFING INSTALLATION

A. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness and bonded securely to substrate.

B. Do not install tile or setting materials over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

3.5 CRACK ISOLATION MEMBRANE INSTALLATION

A. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness and bonded securely to substrate.

B. Do not install tile or setting materials over crack isolation membrane until membrane has cured.

3.6 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove grout residue from tile as soon as possible.
2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
3. Remove temporary protective coating by method recommended by coating manufacturer and that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent drain clogging.

B. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.

C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

D. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.7 INTERIOR TILE INSTALLATION SCHEDULE

A. Interior Floor Installations, Concrete Subfloor:

1. Tile Installation F122: Thin-set mortar on waterproof membrane; TCA F122.

B. Interior Wall Installations, Wood Studs or Furring:

1. Tile Installation W245: Thin-set mortar on coated glass-mat, water-resistant gypsum backer board; TCA W245.

C. Bathtub/Shower Wall Installations, Wood Studs or Furring:

1. Tile Installation B419: Thin-set mortar on coated glass-mat, water-resistant backer board; TCA B419.

END OF SECTION 09 30 00

SECTION 09 51 13

ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Suspended acoustical ceiling panels.
2. Ceiling suspension system.

B. Related Requirements:

1. Heating, Ventilating, and Air-Conditioning (HVAC): Division 23; air diffusers.
2. Electrical: Division 26; lighting fixtures.
3. Fire Suppression: Division 21; sprinkler heads.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

B. Coordination:

1. Develop and coordinate locations of work supported by or penetrating through ceiling with the other Sections involved prior to making shop drawing submittal. In particular, note partitions that are to be installed prior to ceiling installation
2. Coordinate with finishing of caps for concealed sprinkler heads that are to be finished to match color of ceiling panels.
3. Provide additional hangers and inserts as required.

1.4 ACTION SUBMITTALS

A. Shop Drawings: Include the following:

1. Layout of suspension system and location of hangers, seismic braces, and trapezes.
2. Inserts and hanger spacing and fastening details.

3. Trapeze details.
4. Splicing method for main and cross runners.
5. Support of ceiling fixtures and air diffusers, and support of adjacent acoustical panels.
6. Details at changes in ceiling level.
7. Locations and dimensions of access doors, light fixtures, supply and exhaust grilles and diffusers, sprinkler heads, speakers, detection devices, and all other items to be installed in suspended acoustical ceilings.
8. Pattern of mechanical fasteners where used in an exposed location.
9. Seismic control details.

B. Product Data: Manufacturer's catalog cuts for new and replacement suspension system components and acoustical panels.

1. Data sheets shall be marked to identify specific products proposed for use.
2. Include ICC-ES Report for seismic clips.

C. Samples:

1. Not less than 6-inch x 6-inch sample of each type of acoustical panel required.
2. 8-inch-long sample of each type of exposed suspension member and trim, showing profile and finish.

D. Structural Design: Seismic and structural design engineering calculations prepared by the engineer in responsible charge retained by the Contractor shall be submitted to demonstrate compliance with CBC and adequacy of suspension system to withstand specified seismic and structural loading. Engineer shall be a California licensed civil or structural engineer.

1.5 MAINTENANCE MATERIALS

A. Acoustical Units: Furnish extra material equal to two full cases of the material manufacturer for each acoustical panel product provided on the Project.

B. Deliver and store in accordance with instructions provided by the General Contractor.

1.6 CLOSEOUT SUBMITTALS

A. Warranties as specified.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Minimum of three installations of extent comparable to Project.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver with manufacturers’ labels indicating brand name, pattern, size, thickness.

B. Store cartons open at each end to stabilize moisture content and temperature.

C. Do not begin installation until sufficient materials to complete a room are received.

D. Comply with additional requirements specified in Section 01 60 00, "Product Requirements."

1.9 FIELD CONDITIONS

A. Ambient Conditions, Unless Otherwise Acceptable to Material Manufacturer:

1. Do not install acoustical ceilings until building is enclosed, sufficient heat is provided, and dust-generating activities have been terminated.
2. Maintain a uniform temperature between 55 and 70 degrees F prior to and during installation of materials.

B. Do not install acoustical ceilings until work above ceilings is completed, including testing and approval of mechanical work.

C. Notify Architect, in writing, of any conditions preventing proper application of acoustical ceilings.

1.10 WARRANTY

A. Manufacturers: Furnish University with the following extended product warranties from manufacturer.

1. Acoustical Panels: 10 years.
2. Suspension Grid: 10 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: As listed with individual products.

B. Products of other manufacturers will be considered for substitution, provided that materials match designated products in color, texture, appearance, and performance to Architect's satisfaction.

2.2 DESIGN AND PERFORMANCE CRITERIA

A. Seismic Requirements:

1. Ceilings shall demonstrate compliance with CBC, and adequacy of suspension system to withstand specified seismic and structural loading. See also Structural Drawings, "Structural Design Criteria," sheet S0.01, for additional seismic design information and seismic performance requirements as they may apply to interior non-structural components and systems. Seismic bracing and restraint shall be designed to meet the more stringent of the standards referenced in either the individual technical specifications, or the CBC.
2. Ceiling Compression Struts:

a. Provide struts as shown on Drawings and as required by code, placed maximum 12 feet on center in both directions and within 6 feet of each wall.

b. Bracing system shall be adequate to support nonbearing ceiling-height partitions spaced at 10 feet on center.

B. Fire Performance Characteristics:

1. Surface Burning Characteristics: Provide products complying with ASTM E 1264 for Class A products and meeting the following when tested in accordance with ASTM E84.

a. Flame Spread: 25 or less.
b. Smoke Developed: 50 or less.

C. Tolerances:

1. Deflection, ASTM C635: Maximum 1/360 of span. Applies to suspension system components, hangers, and fastening devices supporting light fixtures, ceiling grilles, and to acoustical panels.
2. Allowable Tolerance of Finished Acoustical Ceiling System: Level within 1/8 inch in 12 feet.

2.3 SUSPENSION SYSTEMS

A. Comply with ASTM C635.

B. Structural Classification: Heavy-duty.

C. Main and Cross Members: Hot-dip galvanized, cold-rolled steel.

D. Standard Grid Edge Moldings: Hot-dip galvanized, cold-rolled steel, minimum 0.020-inch-thick steel.

1. Typical Profile: Channel or angle, minimum flange width of 15/16 inch.

E. Additional Accessories and Trim: Extruded aluminum with factory-applied baked enamel finish;

1. Products and Profiles: As indicated in the Drawings.
2. Color: To match ceiling panel, unless otherwise indicated.

F. Splices, End Connections, Clips, and Other Accessories: Hot-dip galvanized steel.

1. Hold-Down Clips: Concealed, spring-loaded, fully accessible.
2. Design to provide strong, rigid, lock-type connections preventing movement or displacement of joined components and permitting disassembly without damage to component parts.
3. Perimeter Seismic Clips: As indicated in the Drawings.

G. Suspension Wire: ASTM A641, Class 1 zinc coating, soft temper.

1. Hanger Wire: 0.106-inch nominal diameter (12 gage).
2. Bracing Wire: 0.120-inch nominal diameter (10 gage).

H. Attachment Devices: Size for five times design load required by ASTM C635, Table 1, Direct Hung, unless otherwise indicated.

I. Compression Struts: "Seismic Compression Post" by Donn or equal manufactured proprietary product conforming to specified requirements and those indicated on the Drawings.

J. Finish:

1. Steel components shall be Bonderized and given a coat of rust-inhibitive paint.
2. Exposed surfaces of components shall have factory-applied semi-gloss white enamel finish, unless otherwise noted.
3. Grid Color: White, unless otherwise specified.

K. Suspension and Grid Types: As specified under Article 2.4 below.

2.4 ACOUSTICAL CEILING PANELS

A. Type:

1. Grid: Direct-hung, exposed tee grid, 15/16 inch wide, white color; "Suprafine" by Armstrong, or equal.

a. Color: White.

2. Panels: 24 x 24 inches x 5/8-inch thick mineral fiber; "Dune," Item No. 1776, by Armstrong, or equal.

a. Edge: Angled Tegular.
b. Texture: Fine.
c. Finish: Factory-applied acoustically transparent paint.
d. NRC: 0.50.
e. CAC: 35.
f. Light Reflectance: 0.83.
g. Bacterial, mold, mildew, soil and moisture resistant.
h. Color: White.
i. Fire rating: Class A in accordance with ASTM E84.

3. General: Cover all exposed field-cut edges of panels with Armstrong Supercoat ceiling touch-up paint, or equal.

PART 3 - EXECUTION

3.1 INSTALLATION OF SUSPENDED ACOUSTICAL CEILINGS

A. Pattern shall be approved by Architect before installation of suspension system.

B. Install suspension system, including necessary hangers, grillage, and other supporting hardware in accordance with CBC, ASTM C636 and ASTM E580, manufacturer’s instructions, and as specified. The most stringent requirements shall govern.

1. Hangers:

a. Coordinate supplemental and new hanger location with other work. Hanger wire attachment devices shall be capable of supporting 100 pounds.

b. Ensure that hangers and carrying channels are located to accommodate fittings and equipment that are to be placed after installation of ceiling grid system.
c. Space hanger wire as required by code for specified wire gage.
d. Install additional hangers at ends of each suspension member, at light fixtures, and 6 inches from vertical surfaces.
e. Do not splay wires more than 5 inches in a 4 foot vertical drop.
f. Wrap wire at least three times horizontally, turning ends upward in the first 3 inches.
g. Provide trapeze suspension or other appropriate system for suspension of ceiling system and light fixtures at large ductwork.
h. Provide two extra tie wires at each light fixture and HVAC register for use in tying off opposite corners at fixtures and registers.
i. Kinks and bends are not permitted in hanger wires to level carrying channels.

2. Main Runners:

a. Space main runners at 4 feet on center.
b. Level and square to adjacent walls.
c. Independently support a maximum of 8 inches from each wall.
d. Secure to structure above with four-way, bracing wire splays as specified and to meet applicable building code requirements for lateral design.

3. Space cross runners at 2 feet on center.

a. Independently support if 8 inches or more from wall.

4. Use standard "Tee" section at grid change in direction.
5. Wall and Perimeter Moldings:

a. Install wall molding at intersection of suspended ceiling and vertical surfaces.
b. Miter corners where wall and perimeter moldings intersect.
c. Attach to vertical surface with concealed mechanical fasteners.

6. Seismic Bracing Assembly: Compression struts and splayed wires.

a. Horizontal Restraints: 4 splayed wires oriented 90 degrees from each other.

1) Seismic bracing wires may be 12 gage if permitted by code.
2) Provide at the following locations and as noted on the Drawings:

a) Not more than 12 feet on center in each direction.
b) Not more than 6 feet from each perimeter walls and edges of vertical ceiling offsets.

3) Splices in bracing wires are not permitted.
4) Angle of wires shall not exceed 45 degrees from the plane of the ceiling.

b. Vertical Restraints: A strut to resist vertical displacement at each seismic splay.

1) Struts shall extend from the grid to structure above and shall be fastened at both ends.
2) Compression struts shall not replace hanger wires.
3) If other than a manufactured proprietary strut is used, it shall be approved by the Architect.

c. Lateral force bracing is not required at ceiling areas less than 144 square feet that are surrounded by walls extending to structure above.
d. Ceiling areas exceeding 2,500 square feet shall have a seismic separation joint with each area provided with closure angles.
e. Seismic perimeter clips shall have current and approved ICC-ES Report and shall be installed in accordance with the details and recommendations of the Report.
f. Provide spreader bars at all main and perimeter runners.
g. Provide bracing to top of ceiling-height partitions as required by code, specified herein, and indicated on the Drawings.

C. Lay-in Acoustical Panels:

1. Install in grid system in accordance with manufacturer's recommendations and procedures in CISCA publication "Acoustical Ceiling Use and Practice." CBC shall govern if in conflict or more restrictive than CISCA publication.
2. Install in level plane in straight line courses.
3. Apply with grain, if any, in same direction, not checkerboard.
4. Minimum Width of Border Panel: One-half panel dimension, unless indicated on the Drawings or approved submittals.
5. Provide trim molding at recessed troffer lights as required.
6. Hold-Down Clips:

a. Acoustical panels surrounding recessed troffer lights shall be installed with hold-down clips to prevent movement or displacement of panels.
b. Provide hold-down clips at perimeter where grid meets wall molding.
c. Exposed fasteners are not acceptable.

7. Trim or rout tegular-edge panels to provide tegular edge at perimeter moldings. Touch-up exposed cut edges with white paint from panel manufacturer.
8. Coordinate lay-in system with electrical fixtures and mechanical work that will be integrated with the ceiling.

D. Ceiling Mounted Light Fixtures and HVAC Terminals:

1. Secure with mechanical fasteners to the ceiling grid runners to resist a horizontal force equal to the weight of the fixture.
2. Independently support with wires to structure above as follows:

a. Fixtures Less than 10 Pounds: One 12-gage wire from the fixture housing. This wire may be slack.
b. Fixtures Between 11 and 55 Pounds: Two 12-gage wires attached to fixture and structure above. These wires may be slack.
c. Fixtures 56 pounds and more shall be independently supported using 9-gage wire:

3. Fasteners shall be concealed in completed installation.

3.2 CLEANING

A. Clean soiled or discolored surfaces after installation.

B. Touch up scratches, abrasions, voids, and other defects in painted surfaces.

C. Remove and replace damaged or improperly installed work.

END OF SECTION 09 51 13

SECTION 09 65 00

RESILIENT FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes

1. Resilient tile flooring.
2. Resilient base.
3. Resilient sheet flooring.
4. Resilient edge trim and accessories.

B. Related Requirements:

1. Section 01 45 20, "Concrete Moisture Testing."
2. Section 03 39 00, "Concrete Curing – Proactive Moisture Control."

1.3 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

1.4 ACTION SUBMITTALS

A. Shop Drawings: Layout and seaming diagrams for resilient sheet flooring. In preparing seaming diagram, keep seams to a minimum, and comply with the following:

1. Flooring shall be laid in the same direction unless specifically shown otherwise.
2. Seams run length of area.
3. Main traffic runs along length of seam.
4. Seams are away from areas subject to pivoting traffic.
5. Seams are not perpendicular to doorway openings.
6. Seams parallel to doors are centered directly under door.

B. Product Data: Manufacturer's technical data for each resilient product required.

1. Include profiles of resilient edge strips and reducers.
2. Include laboratory tests reports for flooring products showing compliance with specified slip resistance.

C. Samples:

1. Tile: Full size for each type, color, and pattern.
2. Sheet: 12 inches square or larger if requested by Architect.
3. Base: 12-inch long by full dimension, in selected color.
4. Accessories: 9 inches long by full dimension.

D. Sustainable Design:

1. General:

a. Submit information necessary to establish and document compliance with the 2022 California Green Building Standards Code (CALGreen).
b. Sustainable design submittals are in addition to other submittals.
c. If submitted item is identical to that submitted to comply with other requirements, submit duplicate copies as a separate submittal.

2. The following information shall be provided:

a. Printed statement of volatile organic compounds (VOCs) of adhesives, sealants, and sealers applied inside the weatherproofing.
b. Printed statement of volatile organic compounds (VOCs) of field-applied paints and coatings inside the weatherproofing.

1.5 INFORMATIONAL SUBMITTALS

A. Results of substrate moisture content tests.

1.6 CLOSEOUT SUBMITTALS

A. Extended product warranties from manufacturers.

1.7 MAINTENANCE SUBMITTALS

A. Furnish additional floor-covering materials for replacement and maintenance. Furnish, in factory-packaged and –labeled cartons.

1. Flooring: 5 percent of square footage of each size, color, pattern, and type of material included in the work.
2. Base: Not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, profile, and size installed.

B. Supply extra materials from same production lots and color runs as used in work.

C. Deliver the extra material to Project just prior to Substantial Completion, and store as directed by Owner.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: At least three installations of extent comparable to this Project.

B. Slip Resistance: Flooring, after application of any specified finishes, shall provide a value equal to or greater than 0.42 when tested in accordance with DCOF AcuTest procedure contained in ANSI A137.1:2012, Section 9.6.

1. If manufacturer of selected flooring does not have test data to substantiate compliance with DCOF AcuTest value, provide alternative testing to verify compliance, including static coefficient value of 0.60 for level surfaces as determined by testing identical products in accordance with ASTM C1028, if acceptable to governing authorities.
2. Laboratory tests shall be made on a minimum of samples of each material and finish proposed for use.

C. Mockups:

1. First installed area or example of sheet flooring with welded seams and self-coved base shall serve as a mock-up for review and approval by Architect of workmanship, visual effect, and interface with adjacent construction.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Comply with additional requirements specified in Section 01 60 00, "Product Requirements."

1.10 FIELD CONDITIONS

A. Ambient Conditions:

1. Maintain temperature in spaces to receive resilient flooring between 70 and 90 degrees F for at least 24 hours before installation, during installation, and 48 hours after installation.
2. Store resilient flooring materials in spaces where they will be installed for at least 48 hours before beginning installation.
3. Maintain minimum temperature of 55 degrees F for remainder of construction period.
4. Do not install flooring when relative humidity exceeds 45 percent.

B. Suitability of Substrate:

1. Concrete surfaces shall be subject to moisture content testing as specified in Section 01 45 20, "Concrete Moisture Testing."
2. Substrate shall be flat to within 3/16 inch in 10 feet and shall be such that finish floor will not show "telegraphing" of irregularities.

C. Install resilient flooring products after other finishing operations, including painting, have been completed.

1.11 WARRANTY

A. Manufacturer: Furnish Owner with manufacturer’s written warranties as available for the resilient flooring products installed.

PART 2 - PRODUCTS

2.1 RESILIENT FLOORING

A. General:

1. Flooring shall:

   a. Be uniform in thickness and size.
   b. Have edges cut accurately and square.
   c. Be uniform in color, with variations in variegated patterns kept to a minimum.

2. Flooring in any one continuous area shall be from the same lot and shall have the same shade and pattern.
3. Provide each type of resilient product by a single manufacturer, including recommended primers, adhesives, sealants, and leveling compounds.
4. Colors and Designs: To be selected by Architect from manufacturer's standards.

B. Luxury Vinyl Tile (LVT): Heterogeneous Floor. See Drawing A304, “Finish Schedule,” Flooring section for Luxury Vinyl Tile type: **LVT-1**.

1. Size: As specified in Finish Schedule.
2. Overall Thickness: As specified in Finish Schedule.
3. Style/Finish: As specified in Finish Schedule.
4. Color/Pattern: As specified in Finish Schedule.
5. Installation: See finish floor plan Drawings for pattern.
6. Location: See finish floor plan Drawings.
7. Wear Layer Thickness: 40 mil.
8. Specification (ASTM F1700): Class III, Type A & B.
9. Coefficient of Friction (COF) (ASTM D2047): >/= 0.5 Leather; 0.6 Rubber.
10. Fire Test Data:

    a. Flooring Radiant Panel (ASTM E648): >/= 0.45 watts/sq.cm, Class I.
    b. Smoke Evolution (ASTM E662): < 450.

11. Adhesive: Manufacturer’s recommended adhesive varies according to the moisture content and alkalinity of the substrate. For porous substrates, refer to Manufacturer’s recommendation for the selection of the appropriate adhesive, summarized as follows:

    a. Amtico High Pressure Sensitive, Full Spread / RH 90%, MVER 8, pH5-9
    b. Amtico 373, Full Spread / RH 80%, MVER 5, pH 7-10
    c. XpressStep for LVT Spray Adhesive / RH 90%, MVER 8, pH11
    d. XpressStep Premium Spray Adhesive / RH 93%, MVER 10, pH12

C. Sheet Vinyl (SV): Heterogeneous sheet flooring complying with ASTM F1303, Type I, Grade 1, Class B Backing ISO 10582, Type I. See Drawing A304, “Finish Schedule,” Flooring section for Sheet Vinyl type **SV-1**.

1. Size:

   a. Roll Width: As specified in Finish Schedule.
   b. Roll Length: up to 66 feet.

2. Thickness:

   a. Overall Thickness (ASTM F386): 0.080 inches.
   b. Wear Layer Thickness (ASTM F410): 0.022 inches.

3. Color/Pattern: As specified in Finish Schedule.
4. Factory Finish: UV-cured Polyurethane.
5. Installation:

   a. Open Area: Seams with S-761 Seam Adhesive.

6. Fire Test Data:

   a. Flooring Radiant Panel (ASTM E648): >/= 0.45 watts/sq.cm, Class I.
   b. Smoke Evolution (ASTM E662): < 450.

7. Static Coefficient of Friction (SCOF) (ASTM D2047): >/= 0.5.

2.2 RESILIENT BASE AND TRIM

A. Rubber Base (RB): ASTM F1861, Type TS, vulcanized rubber, Group 1, solid, homogenous; See Drawing A304, “Finish Schedule,” Flooring section for Resilient Wall Base type: **B-1**.

1. Size: As specified in Finish Schedule.
2. Color/Pattern: As specified in Finish Schedule.
3. Fire Test Data:

   a. Flooring Radiant Panel (ASTM E648): >/= 0.45 watts/sq.cm, Class I.
   b. Smoke Evolution (ASTM E662): < 450, Class B.

2.3 INSTALLATION ACCESSORIES

A. Adhesives:

1. Provide adhesives as recommended by manufacturer of resilient flooring material for conditions of installation and for each type of flooring.
2. Adhesive shall meet specified VOC requirements.

B. Floor Patch-and-Leveling Compound: Latex cementitious paste for patching, leveling, and ramping; Ardex "SD-P Instantpatch," Raeco "Level Flex Latex Underlayment," or equal acceptable to manufacturer of resilient flooring material furnished.

C. Edge Strips: Molded vinyl in profiles as selected by Architect from manufacturer's standards. Unless otherwise specified, match thickness of abutting flooring material.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspect substrate in order to verify that it is satisfactory. Substrate shall be:

1. Free of excess moisture, as determined by testing.
2. Smooth and free of cracks, holes, ridges, coatings preventing adhesive bond.
3. Free of other defects impairing performance or appearance.

B. Suitability of Substrate:

1. Concrete surfaces shall be subject to moisture content testing as specified in Section 01 45 20, "Concrete Moisture Testing."
2. Substrate shall be flat to within 3/16 inch in 10 feet and shall be such that finish floor will not show "telegraphing" of irregularities.
3. Perform bond tests to ascertain presence of substances detrimental to obtaining adhesive bond.

C. Flooring material shall be visually inspected prior to installation.

1. Do not use material with visual defects.
2. Verify flooring material is from the same batch number (dye lot).

3.2 PREPARATION

A. Comply with ASTM F710 and manufacturer's recommendations for surface preparation.

1. Use leveling and patching compounds, as recommended by resilient flooring manufacturer, for filling small cracks, holes, and depressions in subfloor to within specified tolerances and criteria.
2. Remove protrusions, and grind smooth.
3. Remove coatings that might prevent adhesive bond, including curing compounds incompatible with resilient flooring adhesives.
4. Steel troweled concrete shall be properly roughened-up (sanded) to ensure suitable adhesion.
5. Vacuum surfaces to be covered.

B. Apply concrete slab primer, if recommended by flooring manufacturer, prior to application of adhesive. Apply in compliance with manufacturer's directions.

3.3 APPLICATION OF ADHESIVES

A. Mix and apply adhesives in accordance with manufacturer's instructions. Prime surfaces if recommended by adhesive manufacturer.

B. Apply uniformly over substrates.

1. Cover only that amount of area that can be covered by flooring material within the recommended working time of adhesive.
2. Remove any adhesive that dries or films over.
3. Do not soil walls, bases, or adjacent areas with adhesive.

4. Promptly remove any spillage.

C. Apply adhesives with notched trowel or other suitable tool.

D. Clean trowel, and rework notches as necessary to ensure proper application of adhesive.

3.4 INSTALLATION OF TILE FLOORING

A. Install resilient flooring into adhesive when the adhesive has completely dried according to the adhesive manufacturer's guidelines.

B. Lay tile from center of room or space, working toward perimeter.

1. Lay tile parallel to room axis in straight courses, with cross joints perpendicular and straight.
2. Lay tile in ashlar pattern.
3. Do not lay tile less than one-half width of a field tile, except where accepted by Architect for irregularly shaped rooms or spaces.

C. Fit tile neatly and tightly into breaks and recesses, against bases, around pipes and penetrations, under saddles or thresholds, and around permanent cabinets and equipment. Cut tile neatly and accurately to fit within 1/64 inch of abutting surfaces.

D. Roll with a coated 100 pound roller immediately after the flooring is placed, ensuring complete contact with the adhesive.

3.5 INSTALLATION OF BASE AND EDGE STRIPS

A. General:

1. Match edges at seams, or double-cut adjoining lengths.
2. Install with tight butt joints.
3. Maintain minimum measurement of 18 inches between joints.

B. Top-Set Base:

1. Install base around perimeter of room or space at base of partitions, columns, pilasters, and other permanent fixtures where scheduled.
2. Unroll base material, and let relax.
3. Cut into accurate lengths as required for minimum number of joints.
4. Apply adhesive, and firmly adhere to wall surfaces.
5. Press down so that bottom cove edge follows floor profile.
6. Corners:

    d. Miter internal corners.
    e. Use premolded corners for internal and external corners.

7. Scribe base accurately to abutting materials.

C. Edge Strips:

1. Apply adhesives, and bond securely to substrates in straight, true lines.
2. Provide where resilient flooring terminates, exposing edge of covering.

3. Center edge strips under doors where resilient flooring terminates at a door opening.
4. Top of strips shall be flush with top of resilient flooring.
5. Install reducer strips where required to provide smooth transition between resilient flooring and other finish.

3.6 FINISHING AND CLEANING

A. Clean approximately 72 hours after installation, or after adhesives have cured and after completion of adjacent work, as recommended by manufacturer for type of flooring installed.

1. Sweep or vacuum floor thoroughly.
2. Clean surfaces with a neutral cleaner.
3. Follow manufacturer's recommended procedure for cleaning and polishing.
4. Remove excess adhesive and other surface blemishes, using appropriate recommended cleaner.

B. Protect flooring against damage and from normal wear and tear during construction period, in accordance with flooring manufacturer's directions, so that flooring will remain without indication of use or damage.

1. Protect flooring by covering with non-staining building paper. Do not use adhesive backed protections.
2. Protect flooring against rolling loads by covering with plywood or hardboard. Use dollies to move stationary equipment or furnishings across floors.

END OF SECTION 09 65 00

SECTION 09 68 13

TILE CARPETING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes

1. Modular Carpet Tile.

B. Related Requirements:

1. Section 01 45 20, "Concrete Moisture Testing."
2. Section 03 30 00, "Cast-in-Place Concrete."
3. Section 09 65 00, "Resilient Flooring," for resilient wall base and accessories installed with carpet tile.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to carpet tile installation including, but not limited to, the following:

a. Review delivery, storage, and handling procedures.
b. Review ambient conditions and ventilation procedures.
c. Review subfloor preparation procedures.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
2. Include installation recommendations for each type of substrate.

B. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet Tile: Full-size Sample.
2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch- (300-mm-) long Samples.

1.6 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:

1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.8 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI 104.

1.10 FIELD CONDITIONS

A. Comply with CRI 104 for temperature, humidity, and ventilation limitations.

B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at occupancy levels during the remainder of the construction period.

C. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.11 WARRANTY

A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.

1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
2. Failures include, but are not limited to, more than 10 percent edge raveling, snags, runs, dimensional stability, excess static discharge, loss of tuft bind strength, loss of face fiber, Insert failure characteristic and delamination.
3. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE:

A. Drawing Designation: See Drawing A304, "Finish Schedule," for Carpet Tile designations:

1. Carpet Tile designation **CPT-1**.

a. Manufacturer: Patcraft.
b. Style/Finish: Forage - Contemplative.

2. Carpet Tile designation **CPT-2**.

a. Manufacturer: Patcraft.
b. Style/Finish: Forage - Wellbeing.

B. Product Details: As indicated on the Drawings.

2.2 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.

1. Adhesives shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Adhesives shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by resilient sheet flooring manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by resilient sheet flooring manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
4. Moisture Testing: Proceed with installation only after substrates pass testing according to resilient sheet flooring manufacturer's written recommendations, but not less stringent than the following:

    a. Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
    b. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level.

C. Install concrete moisture limitor approved by resilient flooring manufacturer over concrete slab at areas designated for resilient flooring when environmental conditions prevent relative humidity to reach a maximum of 75 percent. Moisture limitor shall be installed in accordance with manufacturer’s written instructions.

D. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch (3 mm) wide or wider and protrusions more than 1/32 inch (0.8 mm) unless more stringent requirements are required by manufacturer's written instructions.

E. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.

F. Clean metal substrates of grease, oil, soil and rust, and prime if directed by adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to remove metal oxides, immediately before applying adhesive.

G. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

A. General: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.

B. Installation Method: As recommended in writing by carpet tile manufacturer.

C. Maintain dye lot integrity. Do not mix dye lots in same area.

D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.

E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.

G. Install pattern parallel to walls and borders.

H. Stagger joints of carpet tiles so carpet tile grid is offset from access flooring panel grid. Do not fill seams of access flooring panels with carpet adhesive; keep seams free of adhesive.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet tile:

1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
2. Remove yarns that protrude from carpet tile surface.
3. Vacuum carpet tile using commercial machine with face-beater element.

B. Protect installed carpet tile to comply with CRI 104, Section 16, "Protecting Indoor Installations."

C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 09 68 13

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SECTION 09 91 13

EXTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes surface preparation and the application of paint systems on exterior substrates.

1.3 DEFINITIONS

A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

D. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

E. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

F. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Samples for Verification: For each type of paint system and each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inches (200 mm) square.
2. Step coats on Samples to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

C. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

1.7 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.

a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.

a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.9 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products are specified under "Paint Systems" in Part 3 below and are manufactured by Dunn-Edwards Corporation, unless otherwise indicated.

1. Manufacturer’s catalog names and number of paint types in this Section herein are based on products of Dunn-Edwards Corporation and is the standard of quality. Dientes Community Dental Care has chosen Dunn-Edwards products as their basis of design.
2. Substitutions are not allowed.

B. Materials selected for coating systems for each type surface shall be the product of a single manufacturer or shall be acceptable to manufacturer of finish coating for system.

2.2 PAINT, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

B. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

C. Colors: As indicated in a color schedule.

1. Where color is selected prior to bid submittal, Contractor shall bid two (2) or more finish coats, as appropriate to the color selected, and shall expressly state number of finish and prime coats and type (full or spot) of prime coat.

2.3 BLOCK FILLERS

A. Block Filler, Latex, Interior/Exterior:

2.4 PRIMERS/SEALERS

A. Primer, Alkali Resistant, Water Based.

B. Primer, Bonding, Water Based.

C. Primer, Bonding, Solvent Based.

D. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.

2.5 METAL PRIMERS

A. Primer, Alkyd, Anti-Corrosive for Metal.

B. Primer, Alkyd, Quick Dry, for Metal.

C. Primer, Galvanized, Water Based.

D. Primer, Galvanized: As recommended in writing by topcoat manufacturer.

E. Primer, Quick Dry, for Aluminum.

2.6 WOOD PRIMERS

A. Primer, Latex for Exterior Wood.

B. Primer, Alkyd for Exterior Wood.

C. Primer, Oil for Exterior Wood.

2.7 WATER-BASED PAINTS

A. Latex, Exterior Flat (Gloss Level 1)

B. Latex, Exterior Velvet (Gloss Level 2)

C. Latex, Exterior Low Sheen (Gloss Level 3-4)

D. Latex, Exterior Semi-Gloss (Gloss Level 5)

E. Latex, Exterior, Gloss (Gloss Level 6

2.8 FLOOR COATINGS

A. Sealer, Water Based, for Concrete Floors

2.9 HIGH PERFORMANCE PRIMERS & TOPCOATS FOR STEEL

A. High Performance Two Component Solvent Borne Primer

B. High Performance Two Component Solvent Borne Acrylic Polyurethane

2.9 SOURCE QUALITY CONTROL

C. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Exterior Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 11 percent.
2. Masonry (Clay and CMU): 11 percent.
3. Wood: 15 percent.
4. Portland Cement Plaster: 5 percent.
5. Exterior Gypsum Board Substrates: 5 percent.

C. Moisture: All areas that may cause paint failure due to moisture shall be addressed and eliminated. This would include, but is not limited to the following:

1. Gutters and downspouts not working properly.
2. Previous coats of paint not adhering properly.
3. Wood checking (cracks and splits in wood).
4. Deteriorated caulking.
5. Gaps between substrates.
6. Rotten wood.
7. Areas affected by water splashing.
8. Painting in inclement weather.
9. Painting a substrate where residual moisture exceeds stated limits.
10. Un-caulked nail holes.

D. Portland Cement Plaster Substrates: Verify that plaster is fully cured.

E. Exterior Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

F. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

G. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Where mildew is present, remove mildew by scrubbing with a commercial mildew remover, or, with a solution of one (1) part household bleach mixed in three (3) parts water by volume. The solution should be left on the surface for a minimum of twenty (20) minutes, rinsed thoroughly with clean water to remove any residue, and then allowed to dry completely prior to application of patching/caulking/prime/finish coat systems.

E. Scraping or sanding surfaces of older buildings (especially pre-1978) may release dust containing lead or asbestos. EXPOSURE TO LEAD OR ASBESTOS CAN BE VERY HAZARDOUS TO YOUR HEALTH. Always wear appropriate personal protective equipment during surface preparation, and finish cleanup of any residues by waterwashing all surfaces. For more information, see Dunn-Edwards brochure on “Surface Preparation Safety” or call EPA’s National Lead Information Hotline at 1-800-424-LEAD, or visit www.epa.gov/lead or/asbestos, or contact your state or local Health Department.

F. Pressure washing and surface preparation methods:

1. Pressure wash or water blast to remove oil, grease, dirt, loose mill scale, and loose paint at pressures of 2500-3500 p.s.i. at a flow of 3.0-3.5 gallons per minute. This is the recommended standard for optimal efficiency.

G. Prior to application of prime/finish interior and/or exterior coat systems, provide a clean,sound surface free of dust, dirt contaminants, mildew and efflorescence by use of a power wash and hand scraping or use of mechanical grinders where necessary. Additionally, areas are to be scrubbed with a bristle brush to insure complete removal of any residual salts. Remove all labels, stickers, price tags, etc. from surfaces before priming. Wood areas stamped with ink codes must be spot primed with blocking primers. Power wash areas to be coated to ensure that new salt deposits do not occur. Failure to do so may cause adhesion issues or result in delamination and invalidate any manufacturer warranty given or implied. After cleaning if there is still chalk evident, this condition must be brought to the owner’s attention in writing before any further work is done.

H. Concrete and Masonry Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

1. Wire brush all loose and peeling paint and dust all surfaces before spot priming or applying finish coats. Industry standards apply to applications of cracks, voids, and repairs. Any areas of repair shall be patched and dried before coatings are applied.
2. Cracks should be repaired as follows:

    a. Cracks less than ¼" wide should be filled using Dunn-Edwards Brush Grade Elastomeric Patch.
    b. Cracks wider than ¼"should be cut and scraped to a "V" shape and filled with Dunn-Edwards Trowel Grade Elastomeric Patch. Large cracks and holes may require repeated applications of patching materials to bring flush with adjacent substrate. Feather-in all repairs and caulking to blend with adjacent substrate.

3. Large holes in stucco / plaster/ concrete will be patched with Rapid Set Premium Stucco Patch or Rapid Set Wunderfixx Concrete Patching Compound in appropriate texture to blend with existing texture. Allow stucco patch to cure to acceptable pH level (10) prior to application of prime/finish coat systems. Caulk large cracks in stucco / plaster/ cement with GE-Life Time 920.
4. Spot prime over all patched areas, cracks, and holes then use an appropriate topping material to match existing surface level and texture.

I. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer. All ferrous metals should be thoroughly cleaned and all loose rust or mill scale be removed by wire brush, scraper and/or power tool, such as an electric drill with a wire brush attachment. Any rust spots or bare metal should receive the appropriate prime coat. Rust inhibited primer to be applied on all properly prepared surfaces where rust is evident. Spot Prime where needed with Zero-Rust. Any hard, glossy surfaces should be dulled. Previously painted ferrous metal in sound condition should be washed down with a strong detergent-type cleaner such as Krud-Kutter or Simple Green.

1. SSPC-SP 1, "Solvent Cleaning."
2. SSPC-SP 2, "Hand Tool Cleaning."
3. SSPC-SP 3, "Power Tool Cleaning."

J. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

K. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

1. All galvanized gutters and flashing should be thoroughly cleaned to remove loose and peeling paint.
2. Any bare galvanized metal should be wiped down with a non-petroleum solvent cleaner.
3. Prime bare metal with the specified galvanized metal primer.
4. Any rust on galvanized metal must be removed. Clean to bare metal and apply a rust inhibitive primer.

L. Aluminum Substrates: Remove loose surface oxidation.

M. Wood Substrates:

1. Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.
2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
5. Spot prime all patched and filled areas as well as any new wood with the appropriate primer or sealer as stated in the Finish Schedule.

N. Plastic Trim Fabrication Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
4. Paint entire exposed surface of window frames and sashes.
5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
6. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed to view:

a. Uninsulated metal piping.
b. Uninsulated plastic piping.
c. Pipe hangers and supports.
d. Metal conduit.
e. Plastic conduit.
f. Tanks that do not have factory-applied final finishes.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

A. Cement Plaster Substrates:

1. Prime Coat: EFF-STOP Select Masonry Primer/Sealer (ESSL00).
2. Intermediate Coat: SPARTASHIELD, Exterior 100% Acrylic Velvet Paint (SSHL20).
3. Topcoat: SPARTASHIELD, Exterior 100% Acrylic Velvet Paint (SSHL20).

B. Exterior Metal Doors:

1. Prime Coat: ENDURAPRIME™ Acrylic Rust Preventative Metal Primer (ENPR00).
2. Alternate Prime Coat: BLOC-RUST Premium, Rust-Preventative Metal Primer (BRPR00 Series).
3. Intermediate and Topcoat: ENDURA-COAT® Interior/Exterior Semi-Gloss Industrial Maintenance Coating (ENCT50).
4. Alternate Intermediate and Topcoat: ARISTOSHIELD® Interior/Exterior Semi-Gloss Paint (ASHL50).

C. Wood Trim:

1. Prime Coat: EZ-PRIME Premium Exterior Wood Primer (EZPR00).
2. Intermediate Coat: SPARTASHIELD, Exterior 100% Acrylic Velvet Paint (SSHL20).
3. Topcoat: SPARTASHIELD, Exterior 100% Acrylic Velvet Paint (SSHL20).

D. Gutters, Downspouts, Fascia, Vents, Conduit, Misc. Non-Ferrous Metal:

1. Prime Coat: ULTRASHIELD® Galvanized Metal Primer (ULGM00).

2. Intermediate Coat: SPARTASHIELD, Exterior 100% Acrylic Velvet Paint (SSHL20).
3. Topcoat: SPARTASHIELD, Exterior 100% Acrylic Velvet Paint (SSHL20).

END OF SECTION 09 91 13

SECTION 09 91 23

INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes:

1. Surface preparation and the application of paint systems on interior substrates.

B. Related Requirements:

1. Section 09 29 00, "Gypsum Board."
2. Section 09 91 13, "Exterior Painting," for surface preparation and the application of paint systems on exterior substrates.

1.3 DEFINITIONS

A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

D. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

E. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

F. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inches square.

C. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products are specified under "Paint Systems" in Part 3 below and are manufactured by Dunn-Edwards Corporation, unless otherwise indicated.

1. Manufacturer’s catalog names and number of paint types in this Section herein are based on products of Dunn-Edwards Corporation and is the standard of quality. Dientes Community Dental Care has chosen Dunn-Edwards products as their basis of design.
2. Substitutions are not allowed.

B. Materials selected for coating systems for each type surface shall be the product of a single manufacturer or shall be acceptable to manufacturer of finish coating for system.

2.2 PAINT, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

B. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 150 g/L.
3. Dry-Fog Coatings: 400 g/L.
4. Primers, Sealers, and Undercoaters: 200 g/L.
5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
7. Pretreatment Wash Primers: 420 g/L.
8. Floor Coatings: 100 g/L.
9. Shellacs, Clear: 730 g/L.
10. Shellacs, Pigmented: 550 g/L.

D. Low-Emitting Materials: Interior paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. Colors: As indicated in the color schedule.

1. Where color is selected prior to bid submittal, Contractor shall bid two (2) or more finish coats, as appropriate to the color selected, and shall expressly state number of finish and prime coats and type (full or spot) of prime coat.

2.3 PRIMERS/SEALERS

A. Dunn-Edwards Paints, UGSL00 Ultra-Grip Select Multi-Surface Primer.

2.4 WATER-BASED PAINTS

A. Dunn-Edwards Paints, SZRO10 Spartazero Flat Zero VOC.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Wood: 15 percent.
2. Gypsum Board: 12 percent.

C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

E. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

D. Maximum Moisture Content of Interior Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 11 percent or less.
2. Masonry (Clay and CMU): 11 percent or less.
3. Wood: 8 percent or less.
4. Plaster: 5 percent or less.
5. Gypsum Board: 5 percent or less.

E. Moisture: All areas that may cause paint failure due to moisture shall be addressed and eliminated. This would include, but is not limited to the following:

1. Previous coats of paint not adhering properly.
2. Wood checking (cracks and splits in wood).
3. Deteriorated caulking.
4. Gaps between substrates.

5. Rotten wood.
6. Areas affected by water splashing.
7. Painting a substrate where residual moisture exceeds stated limits.

F. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

G. Where mildew is present, remove mildew by scrubbing with a commercial mildew remover, or, with a solution of one (1) part household bleach mixed in three (3) parts water by volume. The solution should be left on the surface for a minimum of twenty (20) minutes, rinsed thoroughly with clean water to remove any residue, and then allowed to dry completely prior to application of patching/caulking/prime/finish coat systems.

H. Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

I. Scraping or sanding surfaces of older buildings (especially pre-1978) may release dust containing lead or asbestos. EXPOSURE TO LEAD OR ASBESTOS CAN BE VERY HAZARDOUS TO YOUR HEALTH. Always wear appropriate personal protective equipment during surface preparation, and finish cleanup of any residues by waterwashing all surfaces. For more information, see Dunn-Edwards brochure on “Surface Preparation Safety” or call EPA’s National Lead Information Hotline at 1-800-424-LEAD, or visit www.epa.gov/lead or/asbestos, or contact your state or local Health Department.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 INTERIOR PAINTING SCHEDULE

A. Gypsum Wallboard Walls and Ceilings: See wall paint designations P-1, P-3, and P-4, and ceiling paint designation C-1 in drawing A304, "Finish Schedule," for more information on the full range of colors/patterns.

1. Prime Coat: ULTRA-GRIP Select, Interior/Exterior Multi-Surface Primer (UGSL00).
2. Intermediate Coat: SPARTAWALL, Interior Eggshell Paint (SWLL30).
3. Topcoat: SPARTAWALL, Interior Eggshell Paint (SWLL30).

B. Metal Doors and Trim: See designations P-2 in drawing A304, "Finish Schedule," for more information on colors.

1. Prime Coat: ULTRA-GRIP Select, Interior/Exterior Multi-Surface Primer (UGSL00).
2. Intermediate Coat: ARISTOSHIELD® Interior/Exterior Semi-Gloss Paint (ASHL50).
3. Topcoat: ARISTOSHIELD® Interior/Exterior Semi-Gloss Paint (ASHL50).

END OF SECTION 09 91 23

SECTION 10 14 23

PANEL SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Panel signs.
2. Building Signage
3. Room-identification signs.
4. Code-required signage including:

    a. Building restroom identification.
    b. Occupant load signs at assembly-type rooms.
    c. Emergency evacuation.
    d. Non-illuminated exit signs.
    e. Electrical and mechanical equipment room identification.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Submittal Requirements:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

1.4 COORDINATION

A. Furnish templates for placement of sign-anchorage devices embedded in permanent construction by other installers.

B. Furnish templates for placement of electrical service embedded in permanent construction by other installers.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For panel signs.

1. Include fabrication and installation details and attachments to other work.
2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
3. Show message list, typestyles, graphic element, including raised characters and Braille, and layout for each sign at least half size.

C. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:

1. Panel Signs: Not less than 12 inches (300 mm) square, including corner.
2. Room-Identification Signs: Full-size Sample.
3. Vinyl Signs: Not less than 12 inches (300 mm) square, including corner.
4. Variable Component Materials: Full-size Sample of each base material, character (letter, number, and graphic element) in each exposed color and finish not included in Samples above.

D. Sign Schedule: Prepare for all signage. Include, as a minimum, identifying tag, sign location using same Room and location identification shown on the Drawings, graphics and text for sign, type cross referenced to shop drawings, colors, quantity, and any notes necessary to describe unique characteristic of sign. Use same designations specified or indicated on Drawings or in a sign schedule.

1.6 QUALITY ASSURANCE

A. Furnish products of a single manufacturer for each sign type and graphic image processes indicated.

B. Fabricator/Installer Qualifications: A firm currently and regularly manufacturing and installing sign programs and with documented on time, successful experience providing sign programs similar to that required for this Project.

1.7 FIELD CONDITIONS

A. Field Measurements: Verify locations of anchorage devices and electrical service embedded in permanent construction by other installers by field measurements before fabrication, and indicate measurements on Shop Drawings.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver signs to site at time of installation. Do not store signs on site.

B. Comply with additional requirements specified in Section 01 60 00, "Product Requirements."

1.9 WARRANTY

A. Manufacturer's Standard Product Warranties:

1. Acrylic Elements: Manufacturer's 5 year warranty against yellowing, cracking, crazing or other visible and performance defects.
2. Paint Coating: Manufacturer's 5 year warranty against defects in materials including fading, peeling, and blistering.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: Comply with applicable provisions in 2010 Americans with Disabilities Act Design Guidelines and California Building Code Chapter 10 and 11B for signs.

1. Braille Application: Precisely formed, uniformly opaque to comply with relevant ADA regulations and the requirements indicated for size, style, spacing, content, positions and colors.

a. Braille to be relieved 1/32 inch minimum from plaque surface by manufacturer's photomechanical stratification processes.
b. Translation of sign copy to be the responsibility of the manufacturer.

2.2 SIGNS

A. Panel Sign: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:

1. Solid-Sheet Sign Acrylic sheet with finish specified in "Surface Finish and Applied Graphics" Subparagraph below and as follows:

a. Thickness: Manufacturer's standard for size of sign.

2. Mounting: Manufacturer's standard method for substrates indicated.
3. Surface Finish and Applied Graphics

a. Integral Acrylic As selected by Architect from full range of industry colors.

4. Text and Typeface: Arial.
5. Flatness Tolerance: Sign panel shall remain flat or uniformly curved under installed conditions as indicated and within a tolerance of plus or minus 1/16 inch (1.5 mm) measured diagonally from corner to corner.

B. Room-Identification Sign: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:

1. Laminated-Sheet Sign: Photopolymer face sheet with raised graphics laminated over to acrylic or phenolic backing sheet to produce composite sheet.

a. Color(s): As selected by Architect from manufacturer's full range.

2. Mounting: Manufacturer's standard method for substrates indicated.
3. Text and Typeface: Accessible raised characters and Braille.

C. Exterior Metal Signs: Building signage with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:

1. Custom Logo and Lettering:

a. Dimensional Characters for Building Address and Name Identification: Flat-cut aluminum, at least 1/2 inch thick.

1) Dimensions: as indicated on the Drawings.
2) Font: as shown on the Drawings.
3) Finish: anodized; color to be selected by Architect.

b. Graphic Layout: As shown on the Drawings.
c. Provide with 1-1/4-inch-diameter standoffs, heights as indicated on Drawings.

2.3 PANEL-SIGN MATERIALS

A. Acrylic Sheet: ASTM D 4802, category as standard with manufacturer for each sign, Type UVF (UV filtering).

B. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

C. Anchors and Inserts: Nonferrous metal or hot-dipped galvanized anchors and inserts as required for corrosion resistance.

D. Aluminum Sheet: ASTM B209, Alloy selected by sign fabricator to meet the structural requirements of the specific application. Surface finish shall be smooth, free of extrusion marks or imperfections.

2.4 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:

1. Use concealed fasteners and anchors unless indicated to be exposed.
2. Exposed Metal-Fastener Components, General:

a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.

B. Adhesive: As recommended by sign manufacturer.

C. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inch (1.14 mm) thick, with adhesive on both sides.

1. Double-sided urethane foam tape, 3M #4016, or accepted equal.
2. Double-sided acrylic foam: 3M "VHB" Series," or accepted equal.

2.5 FABRICATION

A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.

1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
3. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
4. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.

B. Shop- and Subsurface-Applied Vinyl: Align vinyl film in final position and apply to surface. Firmly press film from the middle outward to obtain good bond without blisters or fishmouths.

C. Brackets: Fabricate brackets, fittings, and hardware for bracket-mounted signs to suit sign construction and mounting conditions indicated. Modify manufacturer's standard brackets as required.

1. Aluminum Brackets: Factory finish brackets with baked-enamel or powder-coat finish to match sign-background color color unless otherwise indicated.

2.6 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.

D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of signage work.

B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.

C. Verify that anchor inserts are correctly sized and located to accommodate signs.

D. Verify that electrical service is correctly sized and located to accommodate signs.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.

1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
2. Install signs so they do not protrude or obstruct according to the accessibility standard.
3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
4. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

B. Room-Identification Signs and Other Accessible Signage: Install in locations on walls as indicated and according to accessibility standard.

C. Mounting Methods:

1. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign in position, and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.
2. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.
3. Shim-Plate Mounting: Provide 1/8-inch- (3-mm-) thick, concealed aluminum shim plates with predrilled and countersunk holes and where other direct mounting methods are impractical. Attach plate with fasteners and anchors suitable for secure attachment to substrate. Attach signs to plate using method specified above.

D. Field-Applied, Vinyl-Character Signs: Clean and dry substrate. Align sign characters in final position before removing release liner. Remove release liner in stages, and apply and firmly press characters into final position. Press from the middle outward to obtain good bond without blisters or fishmouths. Remove carrier film without disturbing applied vinyl film.

E. Signs Mounted on Glass: Provide opaque sheet matching sign material and finish onto opposite side of glass to conceal back of sign.

F. Dimensional Characters: Mount characters using pins recommended in writing by manufacturer for character form, type of mounting, wall construction, and condition of exposure indicated.

1. Provide heavy paper template to establish character spacing and to locate holes for fasteners.
2. Pins shall be of sufficient length for letters to project 1-1/2 inches from wall and with 1/2-inch clearance to wall surface.

3.3 ADJUSTING AND CLEANING

A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.

B. Remove temporary protective coverings and strippable films as signs are installed.

C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 10 14 23

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SECTION 10 21 13

TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes

1. Pedestal-mounted Phenolic Toilet compartments.
2. Hardware for toilet compartments.

B. Related Requirements:

1. Related work specified elsewhere shall include accessories and anchorage/blocking for attachment of compartments.
2. Section 05 50 00, “Metal Fabrications.”
3. Section 06 10 00, “Rough Carpentry;” wood blocking.

C. Furnish all labor and materials necessary for the completion of work in this section as shown on the contract drawings and specified herein.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

1.4 PRODUCTS

A. Submittal of shop drawings and details, for architect’s approval.

B. Colors shall be selected from the manufacturer’s standard range of colors.

C. Color and hardware samples shall be submitted for approval to the architect upon request.

1.5 WARRANTY

A. Special Manufacturer's Warranty: Provide manufacturer's standard form in which manufacturer warrants against defects in materials and workmanship during the following period:

1. Phenolic-Core Toilet Partitions: 25 years.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Toilet compartments to be supplied by Hadrian Inc., 7420 Clover Avenue, Mentor OH, 44060, 440-942-9618, www.hadrian-inc.com.

B. Phenolic-Core Toilet Compartments:

1. Privacy: 72-inch-high doors and panels.

a. Basis of Design Product: **Hadrian Elite Plus**.
b. Style: Pedestal mount.
c. See equipment designation **EQ-18** in Equipment Schedule on Drawing A303, "Equipment Schedule."

C. Phenolic-Core Urinal Screens: To match panels in construction and finish.

1. Basis of Design Product: **Hadrian Urinal Screen**.

a. Style: Pedestal mount.

2.2 MATERIALS

A. Phenolic Door, Panel, and Pilaster Construction, General: Decorative surface papers impregnated with melamine resins, pressed over kraft paper core sheets impregnated with phenolic resin and bonded together under high pressure and temperature.

A. Zinc Aluminum Magnesium and Copper Alloy (Zamac): ASTM B86.

B. Stainless Steel Sheet: ASTM A240 or A666, 300 series.

C. Stainless Steel Castings: ASTM A 743/A 743M.

D. Aluminum: ASTM B221.

2.3 FABRICATION

A. General: Fabricate toilet compartments to sizes indicated on Drawings. Coordinate requirements and provide for attachment of toilet accessories. Provide cutouts for through-partition toilet accessories where required.

B. Doors: Pre-drill holes for latches and hinges. Factory install rubber bumpers secured with press fit and adhesive.

C. Pilasters: Pre-drill holes for hinges.

D. Anchors: Manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters and walls to suit floor and wall conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.

E. Door Size and Swings: Unless otherwise indicated, provide 24-inch- (610-mm-) wide, in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide, out-swinging doors with a minimum 32-inch- (813-mm-) wide clear opening for compartments designated as accessible.

2.4 FINISH

A. Face Sheet Colors: as indicated in Equipment Schedule, Drawing A303.

2.5 HARDWARE AND ACCESSORIES

A. Hinges: Surface mounted, 11-gauge stainless steel with adjustable cams for self-closing operation. Attach to doors and pilasters with manufacturer’s standard stainless steel fasteners.

B. Indicator Latches: Manufacturer’s standard brushed nickel zamac indicator latch assembly with antimicrobial coating showing red in the window when in locked position and green when unlocked.

C. Door Pulls: Manufacturer's standard brushed nickel zamac pulls with antimicrobial coating at outswinging doors that comply with accessibility requirements.

D. Wall Connections: [Three stainless steel stirrup brackets] [Continuous stainless steel channels] at panel to wall, panel to pilaster, and pilaster to wall connections, Grade 304 stainless steel, #4 brushed finish.

E. Coat Hooks:

1. Inswing Doors: Stamped stainless steel door hook, Grade 304 stainless steel, #4 brushed finish, combined coat hook and bumper.
2. Outswing Doors: Stainless steel flat coat hook, Grade 304 stainless steel, #4 brushed finish.

F. Fasteners: Manufacturers standard stainless steel fasteners, vibration resistant, twin lead, with pan heads.

G. Ceiling Support Studs: Heavy duty hanging studs supplied by manufacturer with 4 inch (102 mm) stainless steel sleeves to conceal ceiling connection.

2.6 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Comply with ASTM E84; tested by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 450 or less.

B. Accessibility Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for toilet compartments designated as accessible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for fastening, support, alignment, operating clearances, and other conditions affecting performance of the Work.

1. Confirm location and adequacy of blocking and support required for installation.

B. Do not proceed with installation until conditions meet manufacturer's requirements.

3.2 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices penetrating structural floor to depth indicated in manufacturer’s written instruction.

B. Pedestal Mount Compartments: Secure pedestals to floor and level, plumb, and tighten. Secure continuous head rail to each pilaster. Adjust so tops of doors are parallel with overhead brace when doors are in closed position.

C. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

3.3 ADJUSTING

A. Hardware Adjustment: Adjust and lubricate hardware according to manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 15 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

3.4 FINAL CLEANING

A. Remove packaging and construction debris and legally dispose of off-site.

B. Clean partition and screen surfaces with materials and cleansers in accordance with manufacturer's recommendations.

END OF SECTION 10 21 13

SECTION 10 26 00

WALL PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. High-impact vinyl/acrylic wainscotting.

B. Related Requirements:

1. Section 09 29 00, "Gypsum Board."

1.3 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each impact-resistant wall protection unit.

1.5 QUALITY ASSURANCE

A. Mock-up: First installed example of each product shall serve as a mock-up for review by Architect of workmanship, installation, and visual effect.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store materials in manufacturer's original, unopened packages, clearly identified with manufacturer's name, brand name, quality or grade, and fire hazard classification.

B. Store materials between 45 and 85 degrees F.

PART 2 - PRODUCTS

2.1 WALL PROTECTION

A. High-Impact Wall Covering: Fiberglass reinforced thermosetting polyester resin panel sheets complying with ASTM D 5319; "Standard FRP" by Marlite, 1 Marlite Drive, Dover, OH 44622.

1. See Drawing A304, "Finish Schedule," Wall Protection Designation **FRP-1**.
2. Thickness: Nominal 0.090 inches.
3. Color and Texture: color and texture to be selected by Architect from Manufacturer's full range. See keynotes on Finish Legend.
4. Size: 4-foot-x-10-foot sheet to minimize vertical joints.
5. Trim: Heavy weight extruded aluminum 6063-T5 alloy prefinished at the factory, extrusions as needed for joints/transitions.
6. Adhesive: Either of the following construction adhesives complying with ASTM C 557:

    a. Marlite C-551 FRP Adhesive - Water- resistant, non-flammable adhesive.
    b. Marlite C-915 Construction Adhesive - Flexible, water-resistant, solvent based adhesive, formulated for fast, easy application.
    c. Titebond Advanced Polymer Panel Adhesive – VOC compliant, non-flammable, environmentally safe adhesive.

7. Sealant: Color matched sealant and clear sealant.

    a. Marlite Brand MS-250 Clear Silicone Sealant.
    b. Marlite Brand MS-251 White Silicone Sealant.
    c. Marlite Brand - Color Match Sealant.

8. Fire Rating: Class A (I) Fire Rating.

2.2 PERFORMANCE CRITERIA

A. Products shall be Class A in accordance with NFPA 255, "Method of Test Surface Burning Characteristics of Building Materials."

B. Flammability: Vinyl/acrylic material shall have Class 1 rating (flame spread of 25) in accordance with Tunnel Test ASTM E84.

C. Vinyl/acrylic material shall have Izod impact strength of 24.1 foot-pounds per inch of notch in accordance with ASTM D256.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances**,** and other conditions affecting performance of work.

1. Confirm that corners are plumb and straight.
2. Confirm that surfaces are smooth, uniform, clean and free from foreign matter.

3. Confirm that nails are countersunk, joints and cracks filled flush and smooth with the adjoining surface.

B. Examine walls to which impact-resistant wall protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.

1. Verify that stud spacing does not exceed 24-inches on-center.

C. Repair defects prior to installation.

1. Level wall surfaces to panel manufacturer’s requirements. Remove protrusions and fill indentations.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Complete finishing operations, including painting, before installing impact-resistant wall protection system components.

B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION

A. General: Install impact-resistant wall protection units level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.

B. Comply with manufacturer's recommended procedures and installation sequence.

C. Cut sheets to meet supports allowing 1/8” clearance for every 8 foot of panel.

1. Cut and drill with carbide tipped saw blades or drill bits, or cut with shears.
2. Pre-drill fastener holes 1/8” oversize with high speed drill bit.

a. Space at 8-inches maximum on center at perimeter, approximately 1-inch from panel edge.
b. Space at in field in rows 16-inches on center, with fasteners spaced at 12-inches maximum on center.

D. Apply panels to board substrate, above base, vertically oriented with seams plumb and pattern aligned with adjoining panels.

1. Install panels with manufacturer's recommended gap for panel field and corner joints.

a. Adhesive trowel and application method to conform to adhesive manufacturer’s recommendations.
b. Drive fasteners for snug fit. Do not over-tighten.

E. Apply panel moldings to all panel edges using silicone sealant providing for required clearances.

1. All moldings must provide for a minimum 1/8-inch (3mm) of panel expansion at joints and edges, to insure proper installation.
2. Apply sealant to all moldings, channels and joints between the system and different materials to assure watertight installation.

3.4 CLEANING

A. Immediately after completion of installation, clean plastic covers and accessories using a standard, ammonia-based, household cleaning agent.

B. Remove excess adhesive using methods and materials recommended in writing by manufacturer.

C. Do not use abrasive cleaners.

3.5 PROTECTION

A. Protect installed materials to prevent damage by other trades. Use materials that may be easily removed without leaving residue or permanent stains.

END OF SECTION 10 26 00

SECTION 10 28 13

TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes

1. Toilet accessories.

B. Related Requirements:

1. Section 06 10 00, “Rough Carpentry,” for wood blocking.
2. Section 09 30 00, “Tiling.”
3. Section 10 21 13, “Toilet Compartments.”

1.3 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

1.4 ACTION SUBMITTALS

A. Shop Drawings: Provide setting drawings, templates, instructions, and directions for installation of anchorage devices and cutout requirements in other work.

B. Product Data: Manufacturer's catalog cuts and data sheets, complete parts list, and installation requirements for each accessory item specified.

C. Schedule: Indicate type, quantities, sizes, and locations for accessories.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data and operating instructions.

B. Keys required for each type of equipment and lock.

1.6 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Americans with Disabilities Act (ADA) "Standards for Accessible Design," 2010.
2. State of California Code of Regulations (CCR): Title 24, Building Standards Code California Building Code 2019.
3. City of Santa Cruz Amendments to the above codes.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials in original packaging to prevent soiling, physical damage, or wetting.

B. Protection:

1. Maintain protective covers until installation is complete.
2. Remove protective covers at final cleanup of installation.

C. Comply with additional requirements specified in Section 01 6000, "Product Requirements."

1.8 FIELD CONDITIONS

A. Coordinate submission of installation instruction so that backing, blocking, and framing can be properly installed and work of other trades will not be delayed.

B. Coordinate accessory locations with other work to avoid interference and to ensure proper operation and servicing of accessory units.

C. Furnish inserts and anchoring devices that are required to be set in concrete or built into masonry. Coordinate delivery with other work so as to avoid delay.]

1.9 WARRANTY

A. Manufacturer: Warrant mirrors for 5 years against silver spoilage.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. See Equipment Schedule on Drawing A303, “Equipment Schedule.”

B. Grab Bar:

1. **EQ-10**: ASI 3700.

a. Size: 42" Length.
b. Finish: Satin Stainless Steel.
c. Location: All Restrooms.

C. Grab Bar:

1. **EQ-11**: ASI 3700.

a. Size: 48" Length.
b. Finish: Satin Stainless Steel.
c. Location: All Restrooms.

D. Semi-Recessed Paper Towel Dispenser And Waste Receptacle:

1. **EQ-12**: ASI 0469.

a. Finish: Satin Stainless Steel.
b. Location: All Restrooms Except #1.

E. Fully Recessed Paper Towel Dispenser And Waste Receptacle:

1. **EQ-12.1**: ASI 04697.

a. Finish: Satin Stainless Steel.
b. Location: Restroom #1.
c. Installation: Fully Recessed To Allow For Accessible Door Clearance.

F. Surface Mounted Toilet Tissue And Seat Cover Dispenser With Napkin Waste Disposal:

1. **EQ-13**: ASI 0487-R-9.

a. Finish: Satin Stainless Steel.
b. Location: Restroom #4.
c. Installation: Right Side Surface Mounted.

G. Recessed Toilet Tissue And Seat Cover Dispenser With Napkin Waste Disposal:

1. **EQ-14**: ASI 0487-L.

a. Finish: Satin Stainless Steel.
b. Location: Restroom #2 & #3.
c. Installation: Left Side Recessed.

H. Recessed Toilet Tissue And Seat Cover Dispenser With Napkin Waste Disposal:

1. **EQ-15**: ASI 0487-R.

a. Finish: Satin Stainless Steel.
b. Location: Restroom #1 & #4.
c. Installation: Left Side Recessed.

I. Recessed Baby Changing Station:

1. **EQ-16**: Koala Kare KB310-SSRE.

a. Finish: Satin Stainless Steel.
b. Location: All Restrooms.

J. Mirror:

1. **EQ-17**: ASI Inter-Lok Angle Frame - Plate Glass Mirror 0600-2442, 0600-3636.

a. Size:

1) 24" x 42": Restrooms #1 & #2.
2) 36" x 42": Restrooms #3 & #4.

b. Finish: Stainless Steel.

K. Toilet Partition:

1. **EQ-18**: Hadrian Elite Plus Series Silveretta 328.

a. Size: 72".
b. Finish: Phenolic.
c. Installation: Pedestal Mounted; mount 9" off finish floor.
d. Location: Restrooms #3 & #4.

L. Robe Hook:

1. **EQ-19**: ASI 7308.

a. Finish: Satin Stainless Steel.
b. Location:

a) Doors In Restrooms #1 & #2.
b) Toilet Partition Doors In Restrooms #3 & #4.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Check substrates and recesses for correct dimensions, plumbness of blocking or frames, and preparation and also other conditions that would affect installation of accessories.

B. Verify spacing of plumbing fixtures and toilet partitions that affect installation of accessories.

C. Verify that wiring for hand dryers is in place.

3.2 INSTALLATION

A. Install accessories in locations and at heights indicated on the Drawings.

B. Install accessories in accordance with manufacturer's recommendations and code accessibility requirements, plumb, true to line, complete with all required fasteners and accessories, securely anchored to backing, blocking, or building structure.

1. In bathrooms designated as adaptable, provide backing and blocking in locations as necessary to provide secure anchoring of grab bars to be installed at a future time.

C. Drill holes to correct size. Cut openings for recessed items with 1/4-inch tolerance so that cut is concealed by flange after application of item.

D. Mount recessed accessories into wall openings with wood screws through cabinet side into wood blocking or sheet metal screws into metal blocking or backing.

E. Mount surface-mounted accessories to solid backing or blocking; plumb and align.

1. In bathrooms designated as adaptable, provide backing and blocking in locations as necessary to provide secure anchoring of grab bars to be installed at a future time.

F. Sealants: Comply with requirements of Section 07 92 00, "Joint Sealants."

1. Apply behind toilet accessories as necessary to ensure sanitary and watertight integrity of surfaces.
2. Conceal sealants.

G. Framed Mirrors: Secure to concealed wall hanger in accordance with manufacturer's instructions for theft-resistant mounting.

H. Frameless Mirrors: Secure to substrate with adhesive. Comply with additional requirements for installing frameless mirrors included in Section 08 80 00, "Glazing."

I. Attach grab bars to backing installed in walls to withstand loads prescribed by CBC.

3.3 ADJUST AND CLEAN

A. Remove protective coverings in accordance with manufacturer's instructions.

B. Adjust accessories for proper operation.

C. After completion of installation, clean and polish exposed surfaces.

D. Deliver keys and instruction sheets to Owner.

END OF SECTION 10 28 13

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SECTION 10 41 16

EMERGENCY KEY CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes: Wall-mounted, recessed, emergency key cabinet (lock box) for Monterey County Fire Department.

B. Related Requirements:

1. Joint Sealants: Section 07 92 00.
2. Division 26 and 28 Section for coordination of power and alarm system connections to building alarm system.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

B. Coordination:

1. Coordinate Monterey County Fire Department requirements for keying and key labeling with Section 08 71 00, “Door Hardware.”
2. Coordinate with wall materials specified in other Sections.

1.4 ACTION SUBMITTALS

A. Product Data: Manufacturer's specifications, standard detail drawings, and installation instructions.

B. Shop Drawings: Submit plans, sections and details as required for attachment to structure/substrate. Show assembled unit and anchorage to structural members.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with additional requirements specified in Section 01 60 00, “Product Requirements.”

1.6 FIELD CONDITIONS

A. Locations of lock boxes, where shown, are approximate. Verify exact locations where lock boxes are required prior to installation.

PART 2 - PRODUCTS

2.1 DESIGN AND PERFORMANCE CRITERIA

A. Provide emergency key cabinets as allowed by local emergency jurisdiction guidelines.

B. The approved red sticker shall be placed in the top left corner of the door that keys are provided to open.

C. Size of the lock box shall be the minimum size necessary to secure all the keys for the doors.

2.2 SURFACE-MOUNTED EMERGENCY LOCK BOX

A. Basis-of-Design Product: Subject to compliance with requirements, “Model 3200” Series Hinged Door Model with alarm tamper switch by Knox, or approved equal.

1. U.L. listed box and lock.
2. Size: 7 inches wide x 7 inches high by 3 inches deep.
3. Finish: Manufacturer's standard primer and polyester powder coat.
4. Color: As selected by Architect from Manufacturer’s standard range.

B. Silicone Sealant: As specified in Section 07 92 00, “Joint Sealants.”

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install lock box as shown or directed by Architect in accordance with manufacturer's directions and City of Watsonville Fire Department requirements.

B. Coordinate installation for backing and blocking for attachment to building structure.

C. Seal around lock box frame with specified silicone sealant.

D. After installing the box, the two stickers sent with the lock box shipment shall be applied to the following locations:

1. White reflective sticker - On the lock box cover such that it does not obscure the serial number at the bottom of the faceplate.

2. Red sticker - On the upper right or left side of the entrance door, signifying which side of the entrance the lock box is installed.

E. Corrections: Repair or replace damaged unit or components as directed by Architect. Verify that unit is properly installed and functioning. Take necessary steps to correct operational deficiency.

3.2 ACTIVATION

A. Adjust for proper operation.

B. Contractor shall be responsible for activation of the lockbox, on behalf of the Owner.

END OF SECTION 10 41 16

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SECTION 10 44 13

FIRE PROTECTION CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Semi-Recessed Fire-protection cabinets for the following:

a. Portable fire extinguishers.

B. Related Requirements:

1. Section 06 10 00, “Rough Carpentry;” wood blocking.
2. Section 10 44 16, “Fire Extinguishers.”

1.3 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing recessed-, semirecessed-, or surface-mounting method and relationships of box and trim to surrounding construction.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For fire-protection cabinets to include in maintenance manuals.

1.6 COORDINATION

A. Coordinate sizes and locations of fire-protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.

2.2 FIRE-PROTECTION CABINET

A. Cabinet Type: Suitable for fire extinguisher.

1. Products: Subject to compliance with requirements, provide one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide Larsen’s Manufacturing Company, B 2409-6R, or comparable product by one of the following:

    a. Fire-End & Croker Corporation.
    b. Potter Roemer LLC.
    c. Strike First Corporation of America.

B. Cabinet Material: Cold-rolled steel sheet.

C. Installation: Semi-Recessed Cabinet:

1. See Detail 1, Drawing A910, "interior Details."

D. Cabinet Trim Material: Steel sheet.

E. Door Material: Steel sheet.

F. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

1. Provide manufacturer's standard.
2. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.

G. Accessories:

1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
2. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.
3. Alarm: Manufacturer's standard alarm that actuates when fire-protection cabinet door is opened and that is powered by batteries

H. Materials:

1. Cold-Rolled Steel: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.

    a. Finish: Baked enamel.
    b. Color: White.

2. Transparent Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet).

2.3 FABRICATION

A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

1. Weld joints and grind smooth.
2. Provide factory-drilled mounting holes.
3. Prepare doors and frames to receive locks.
4. Install door locks at factory.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles.

1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
2. Miter and weld perimeter door frames.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.4 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's AMP 500, "Metal Finishes Manual for Architectural and Metal Products," for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces of fire-protection cabinets from damage by applying a strippable, temporary protective covering before shipping.

C. Finish fire-protection cabinets after assembly.

D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls and partitions for suitable framing depth and blocking where recessed cabinets will be installed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare recesses for recessed fire-protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

A. General: Install fire-protection cabinets in locations and at mounting heights indicated.

1. Fire-Protection Cabinets: 48 inches above finished floor to top of cabinet.

B. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.

1. Unless otherwise indicated, provide recessed fire-protection cabinets. If wall thickness is inadequate for recessed cabinets, provide semi-recessed fire-protection cabinets.
2. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.

3.4 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire-protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire-protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire-protection cabinet and mounting bracket manufacturers.

E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10 44 13

SECTION 10 44 16

FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes

1. Section includes portable, hand-carried fire extinguishers.

B. Related Requirements:

1. Section 06 10 00, “Rough Carpentry;” wood blocking.
2. Section 10 44 13, “Fire Protection Cabinets.”

1.3 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.

1.5 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.7 COORDINATION

A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure of hydrostatic test according to NFPA 10.
b. Faulty operation of valves or release levers.

2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Fire End & Croker Corporation.
b. Larsens Manufacturing Company.
c. Potter Roemer LLC.
d. Strike First Corporation of America.

2. Valves: Manufacturer's standard.
3. Handles and Levers: Manufacturer's standard.
4. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.

B. Multipurpose Dry-Chemical Type in Steel Container 2-A:10-B:C, 5-lb (2.3-kg) nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

C. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

a. Orientation: Vertical.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged fire extinguishers.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install fire extinguishers in locations indicated and in compliance with requirements of authorities having jurisdiction.

1. Mounting Height: 48 inches above finished floor to top of fire extinguisher.

END OF SECTION 10 44 16

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SECTION 10 71 23

WINDSCREENS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes

1. Windscreens.
2. Windscreen glazing.
3. Windscreen Gate:

    a. See keynote 5 on drawing A103, "Enlarged Patio Site Plan & Details.
    b. See Gate designation G-01 on drawing A103, "Enlarged Patio Site Plan & Details, and drawing A301, "Door Schedule."

B. Related Requirements:

1. Section 03 30 00, "Cast-in-Place Concrete."
2. Section 07 92 00, "Joint Sealants."

1.3 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

1.4 SUBMITTALS

A. Action Submittals:

1. Shop Drawings: Illustrate products, installation, and relationship to adjacent construction.
2. Product Data: Manufacturer’s descriptive data and product attributes.
3. Samples:

    a. CRL Steel Post Section: 6" long.
    b. Glazing: 12 " x 12".

B. Informational Submittals:

1. Certificate of Compliance: Certification that installed products meet specified design and performance requirements.

1.5 SYSTEM DESCRIPTION

A. Design Requirements:

1. Design wind pressure: In accordance with ASCE 7 and California Building Code.
2. Movement: Ambient temperature range of 120 degrees F.
3. System design to be performed by qualified professional engineer licensed in State of California.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Firm specializing in work of this Section with minimum 2 years' experience.

B. Mockup: Minimum 4 feet long x full height.

1. Approved mockup may remain as part of the Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Contract Documents are based on Cielo Post Windscreen System by C.R. Laurence Co., Inc. www.crlaurence.com.

2.2 MATERIALS

A. Aluminum Extrusions: ASTM B221, 6005-T6 alloy and temper.

B. Glass: ASTM C1172 and ANSI Z97.1, nominally 9/16 inch thick clear laminated with exposed edges polished, consisting of two layers of ¼ inch thick fully tempered glass with 0.060 inch interlayer. See Drawing A302, "Window Schedule," glazing designation **GL-04**.

2.3 FABRICATION

A. Windscreen Height: 6 feet, as indicated in Drawing A402, "Exterior Elevations."

B. Posts:

1. Posts: 4-1/2 x 4-1/2 inches, 90 degree.

C. Gate:

1. CRL Painted Custom Platinum Series Fully Framed Arch Gate System (PLG1PTC) w/ 10" Bottom Rail and 3" Stiles.

D. Horizontal Extrusions: Not required.

E. Mounting: Core.

1. See Drawing A103, "Enlarged Patio Site Plan and Details."

2.4 FINISHES

A. Aluminum: Powder coating, AAMA 2604, to be selected from manufacturer's full color range.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions and approved Shop Drawings.

B. Installation Tolerances:

1. Maximum variation from plumb or level: 1/16-inch in 3 feet or 1/8-inch in any 10 feet, whichever is less.

END OF SECTION 10 71 23

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SECTION 12 24 13

ROLLER WINDOW SHADES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A . Section Includes:

1. Roller shades, manual operation and accessories.
2. Roller shades, motorized operation and accessories:

    a. Intelligent encoded electronic drive system.
    b. Motor controls, interfaces, and accessories.
    c. PoE motorized, sunscreen roller shades as applicable. Work includes local, group and master control systems for shade operation with addressable, DC motors, IP motor hubs, wall controllers, sensors, IP gateways, SAC Shade Controllers and associated software system.

3. Shade Fabric.

B. Related Requirements:

1. Section 09 29 00, "Gypsum Board."
2. Section 08 52 13, "Aluminum-Clad Windows."
3. Section 09 51 13, "Acoustical Panel Ceilings."

1.3 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

B. Coordination:

1. Where motorized shades are to be controlled by control systems provided under other sections, coordinate the work with other trades to provide compatible products.
2. Coordinate the work with other trades to provide rough-in of electrical wiring as required for installation of hardwired motorized shades.

C. Preinstallation Meeting:

1. One week prior to commencing work related to this section. Require attendance of all affected installers.

D. Sequencing:

1. Do not fabricate shades until field dimensions for each opening have been taken with finished conditions in place. "Hold to" dimensions are not acceptable.
2. Do not install shades until final surface finishes and painting are complete.

1.4 REFERENCES

A. ASTM International (ASTM):

1. ASTM G21 and E 2180 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

B. Cradle to Cradle Products Innovation Institute (C2C):

1. C2C (DIR) - C2C Certified Products Registry.

C. National Fire Protection Association (NFPA):

1. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
2. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.

D. Underwriters Laboratories (UL):

1. UL (GGG) - GREENGUARD Gold Certified Products; Current Edition.
2. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

E. Window Covering Manufacturers Association (WCMA):

1. ANSI/WCMA A100.1-2022- Safety of Window Covering Products; 2022.

1.5 ACTION SUBMITTALS

A. Product Data: Manufacturer's catalog pages and data sheets for products specified including materials, finishes, dimensions, profiles, mountings, and accessories.

1. Preparation instructions and recommendations.
2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes , accessories, and operating instructions.
3. Storage and handling requirements and recommendations.
4. Mounting details and installation methods.
5. Manufacturer's Instructions: Include storage, handling, protection, examination, preparation, and installation.
6. Project Record Documents: Record actual locations of control system components and show interconnecting wiring.

7. Motorized Shades: Power requirements. Typical wiring diagrams including integration of EDU controllers with building management system, audiovisual and lighting control systems as applicable.

    a. If using PoE motors, include integration of PoE motor hubs, shade motors, wall controllers, software programming, ability to integrate with building management system, audiovisual and lighting control systems as applicable.

B. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances, wiring diagrams and relationship to adjacent work.

1. Prepare shop drawings on AutoCad or MicroStation format using base sheets provided electronically by the Architect.
2. Prepare control wiring diagrams based on zones, switching and operational requirements provided by the Architect in electronic format.
3. Include one-line diagrams, wire counts, coverage patterns, and physical dimensions of each item.
4. Provide location plan showing all motor locations, switch locations and control zones as per the performance requirements of the specifications. All switches, sensors and other control accessories must clearly be shown and called out in a bill of materials.
5. Provide location plan showing all manual shade control locations. Cross-reference furniture plans for optimal positioning of chains.
6. Provide elevation drawings showing shade band layout. Indicate any necessary seam or batten locations and align with horizontal mullions where possible.

C. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings and include opening sizes and key to typical mounting details.

D. Verification Samples: For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified requirements.

1. Shadecloth Sample: Mark face of material to indicate interior faces.

    a. Test reports indicating compliance with specified fabric properties.
    b. Verification Samples: 6 inches (150 mm) square, representing actual materials, color and pattern.

E. Warranty: Provide manufacturer’s warranty documents as specified in this Section.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of fabric band material, signed by product manufacturer.

C. Product Test Reports: For each type of fabric band material, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roller shades to include in maintenance manuals.

1.8 MAINTENANCE MATERIAL

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Roller Shades: Full-size units equal to 5 percent of quantity installed for each size, color, and fabric band material indicated, but no fewer than two units.

1.9 QUALITY ASSURANCE

A. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

B. Manufacturer Qualifications: Obtain roller shades system through one source from a single manufacturer with a minimum of ten years experience and minimum of five projects of similar scope and size in manufacturing products comparable to those specified in this section.

C. Installer for Roller Shade System - Qualifications: Installer trained and certified by the manufacturer with a minimum of ten years experience in installing products comparable to those specified in this section.

1. Requirements for Roller Shade Installer/Contractor:

a. Roller Shade Hardware, shade fabric, motor, and all related controls shall be furnished and installed as a complete two-way communicating system and assembly.
b. Roller Shade Installer/Contractor shall list all components and systems included in their bid, including but not limited to, the prime manufacturer of the motor control and automated equipment and shall be financially responsible for any change orders and/or back charges required by the BMS, AV, or Lighting Control Systems contractors to interface with the automatic solar tracking system and the motorized roller shade system.
c. If using PoE motors, installer for roller shade system shall be trained and certified by all manufacturers involved including IP gateway, PoE motor hubs, COAP protocol wall controllers, EnOcean enabled keypads and sensors, UPOE+ switch and be capable of complete deployment of controls, software and hardware.

D. Product Listing Organization Qualifications: Organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

E. Fire-Test-Response Characteristics: Passes NFPA 701 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.

F. Electrical Components: NFPA Article 100 listed and labeled by either UL or ETL or other testing agency acceptable to authorities having jurisdiction, marked for intended use, and tested as a system. Individual testing of components will not be acceptable in lieu of system testing.

G. Requirements for Electronic Hardware, Controls, and Switches: Roller shade hardware, shade fabric, EDU (Electronic Drive Unit), and all related controls shall be furnished and installed as a complete two-way communicating system and assembly.

1. If using PoE motors, roller shade hardware, shade fabric, PoE motor hub, DC shade motor, software and all related controls shall be furnished and installed as a complete two-way communicating system and assembly.

H. ShadeCloth Anti-Microbial Characteristics: 'No Growth' per ASTM G 21 results for fungi ATCC9642, ATCC9644 and ATCC9645, and E2180.

I. ShadeCloth Cleanability and Disinfecting: ShadeCloth must meet cleanability and disinfecting requirements via 3rd party testing to comply with BIFMA HCF 8.1-2014 standards using chemical solutions compliant with EPA guidelines for use against COVID-19.

J. Environmental Certification: Submit written certification from the manufacturer, including third party evaluation, recycling characteristics, and perpetual use certification as specified. Initial submittals, which do not include the Environmental Certification will be rejected. Materials that are simply 'PVC free' without identifying their inputs shall not qualify as meeting the intent of this specification and shall be rejected.

1.10 MOCK-UP

A. Provide a mock-up of one roller shade assembly for evaluation of mounting, appearance and accessories.

1. Locate mock-up in window designated by Architect.
2. Mockup Size: Full size.
3. Mockup Size (WxH): 3 x 3 feet (0.94 x 0.94 m) minimum.
4. Intent of mock-up is to demonstrate quality of workmanship and visual appearance.
5. If mock-up is not acceptable, rebuild mock-up until satisfactory results are achieved.
6. Do not proceed with remaining work until, mock-up is accepted by Architect.
7. Retain mock-up during construction as a standard for comparison with completed work.
8. Do not alter or remove mock-up until work is completed or removal is authorized.
9. Full-sized mock-up may become part of the final installation.
10. Full-sized mock-up will become the property of the Owner to be used for spare parts.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Deliver in factory-labeled packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same room designations indicated on Drawings and in Window Treatment Schedule.

B. Store and handle products per manufacturer's recommendations.

1.12 FIELD CONDITIONS

A. Environmental Limitations: Install roller shades after finish work including painting is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Power and control wiring shall be complete and certified, fully operational with uninterrupted communication on the lines and minimal noise certified by a commissioning agent specified in other sections.

1. 485, ICON, Lonmark and Dry Contract Network: Noise on the line not to exceed shade manufacturer's limits.

1.13 WARRANTY

A. Roller Shade Hardware and Chain Warranty: Manufacturer's standard non-depreciating, transferrable warranty for interior shading.

1. Shade Hardware - 10 years unless otherwise indicated:

a. Mecho/5 and Mecho/5x with ThermoVeil, EuroTwill, Soho, Equinox, Midnite, Chelsea, or Classic Blackout shade fabric: 25-years.
b. Mecho/7 including bead chain with ThermoVeil, EuroTwill, Soho, Equinox, Midnite, Chelsea, or Classic Blackout shade fabric: 25-years.
c. ElectroShade with ThermoVeil, EuroTwill, Soho, Equinox, Midnite, Chelsea, or Classic Blackout shade fabric: 25-years.

2. All Mecho Shadecloth: Manufacturer's standard 25-year warranty.
3. Roller Shade Motors, Motor Control Systems, and Accessories: Manufacturer's standard non-depreciating 10-year warranty for AC motors and controls and 10-year warranty for DC motors, power panels and controls. Roller shade low voltage PoE motor and associated wall controller, IDF, plenum located PoE hubs and associated control systems must have manufacturer’s minimum, non-depreciating 10-year warranty. Somfy motors and controls standard 5-year warranty. NuLEDs SpiceBox, keypads, sensors and associated lighting products standard 5-year warranty.
4. Roller Shade Installation: One year from date of Substantial Completion, not including scaffolding, lifts or other means to reach inaccessible areas, which are deemed owners responsibility.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.2 MANUFACTURERS

A. Acceptable Manufacturer for Window Shade Control System as basis of design, performance and warranty: Mecho, which is located at: 42-03 35th St.; Long Island City, NY 11101; ASD Tel: 718-729-2020; Fax: 718-729-2941; Email: marketing@mechoshade.com; Web: www.mechoshade.com. For your local Mecho rep: https://www.mechoshade.com/find-a-rep/

B. Source Limitations: Obtain roller shades from single source from single manufacturer.

2.3 ROLLER SHADES, MANUAL OPERATION AND ACCESSORIES

A. Shade System; General:

1. Components capable of being removed or adjusted without removing mounted shade brackets, or cassette support channel.
2. Smoothly operation raising or lowering shades.
3. Cradle-to-Cradle certified and listed in C2C (DIR).
4. Environmental Product Declaration (EPD): Published disclosure of product's environmental impacts based on a full Life Cycle Assessment (LCA). Manufacturer must have EPD certification by independent 3rd party evaluation service.

B. Basis of Design: UrbanShade, manual operation. As manufactured by Mecho. Fabric window shade system complete with mounting brackets, roller tubes, hembars, hardware, and accessories.

1. Shade Type: Single roller.
2. Drop Position: Regular. Fabric falls off roller tube, close to glass.
3. Drop Position: Reverse. Fabric falls off the room-side of the roller tube.
4. Mounting: Recess mounted in ceiling pocket.
5. Size: As indicated on drawings.
6. Fabric: As indicated under Shade Fabric article.
7. Brackets and Mounting Hardware: Stamped steel. As recommended by manufacturer for mounting indicated accommodating shade fabric roll-up size and weight.
8. Roller Tubes: Extruded aluminum. Capable of being removed and reinstalled without affecting roller shade limit adjustments.

    a. Size: As recommended by manufacturer; for installation conditions, span, and weight of shades.
    b. Fabric Attachment: Extruded channel in tube accepts vinyl spline welded to fabric edge.

        1) Shade Band: Removable and replaceable without removing roller tube from brackets or inserting spline from the side of the roller tube.

9. Hembars: Maintains bottom of shade straight and flat.

    a. Style: Full wrap fabric covered bottom bar, flat profile with heat sealed closed ends.
    b. Style: Exposed aluminum bottom bar with matching finials.

        1) Profile: Rectangular.
        2) Color: Manufacturer's standard coordinated with shade fabric selected.

    c. Room-Darkening Shades: Slotted bottom bar with wool-pile light seal.

10. Manual Operation:

    a. Clutch Operator: Manufacturer's standard material and design integrated with bracket/brake assembly.

        1) Brake Assembly: Mounted on a low-friction plastic hub with wrapped spring clutch.

            a) Brake must withstand minimum pull force of 25 lbs (12 kg) in stopped position.

        2) Clutch/Brake Mounting: On support brackets, independent of roller tube components.

    b. Drive Chain: Continuous loop beaded ball chain. Upper and lower limit stops.

        1) Breaking Force: 45 lbf (200 N) minimum.

    c. Chain Tensioner: Chain tensioning device complying with ANSI/WCMA A100.1-2022.

    d. Lift Assist Mechanism: Contained in idler end of roller tube. When hanging weights exceed roller tube weight limits. Manufacturer’s standard.

11. Accessories:

    a. Fascia: Removable extruded aluminum. Size as required to conceal shade mounting. Attachable to brackets without exposed fasteners.

        1) Finish: Baked enamel.

            a) Color: _____.

        2) Finish: Fabric wrapped to match shade.
        3) Can be installed across two or more shade bands in one piece.
        4) Profile: Radiused.
        5) Configuration: Captured and continuous, as indicated on drawings.

    b. Ceiling Pockets: Manual Premanufactured metal shade pocket with removable closure panel, for recess mounting in acoustical tile or drywall ceilings; size and configuration as indicated on drawings.

        1) Removable closure panel.
        2) 7/8” ceiling tile support.
        3) Use 2” closure assembly by Mecho or 2” ceiling tile receiver by others in lieu of 7/8” ceiling tile support where applicable by code (i.e.: projects in seismic zones).

    c. Room-Darkening Channels, Standard: Extruded aluminum side and center channels with brush pile edge seals, SnapLoc mounting base, and concealed fasteners. Channels to accept one-piece exposed blackout hembar to assure side light control and sill light control.

2.4 ROLLER SHADES, MOTORIZED OPERATION AND ACCESSORIES

A. Shade System; General:

1. Motorized Shades: Comply with NFPA 70.
2. Components capable of being removed or adjusted without removing mounted shade brackets or cassette support channel.
3. Operates smoothly when raising or lowering shades.
4. Cradle-to-Cradle certified and listed in C2C (DIR).
5. Electrical Components: Listed, classified, and labeled as suitable for intended purpose. Test as total system. Individual component testing is acceptable.

    a. Components: FCC compliant where applicable.

B. Basis of Design: ElectroShade with WhisperShade IQ2 EDU. As manufactured by MechoShade Systems LLC. Motor operated fabric window shade system complete with mounting brackets, roller tubes, hembars, hardware, and accessories.

1. Voltage: 120 VAC
2. Voltage: 24 VDC

    a. Optional PoE

3. Description: Double roller.
4. Drop Position: Regular roll.
5. Mounting: Recess mounted in ceiling pocket.
6. Size: As indicated on drawings.
7. Fabric: As indicated under Shade Fabric article.
8. Brackets and Mounting Hardware: As recommended by manufacturer for mounting indicated and to accommodate shade fabric roll-up size and weight.

    a. Material: Provide shade hardware constructed of minimum 1/8-inch (3.18 mm) thick plated steel, or heavier, thicker, as required to support 150 percent of the full weight of each shade. Plastic components without use of steel angle construction do not meet the intent of this specification and shall not be accepted. Styrene based plastics, and /or polyester, or reinforced polyester shall not be accepted.
    b. Provide shade hardware system that allows for field adjustment of motor or replacement of any operable hardware component without requiring removal of brackets, regardless of mounting position (inside, or outside mount).
    c. Provide shade hardware system that allows for operation of multiple shade bands offset by a maximum of 8-45 degrees from motor axis between shade bands (4-22.5 degrees) on each side of the radial line, by a single shade motor (multi-banded shade, subject to manufacturer's design criteria).
    d. All bands within a single motor group shall be aligned within ¼ inch.
    e. Multiple Shade Operation: Provide hardware as necessary to operate more than one shade using a single motor.
    f. Radiused Center Support Brackets: Provide brackets and connectors for radiused window applications.

        1) Maximum Offset: 22.5 degrees on each side for a 45 degree total offset.
        2) Maximum Offset: 8 degrees on each side for a 16 degree total offset.

9. Roller Tubes:

    a. Material: Extruded aluminum.

b. Size: As recommended by manufacturer; selected for suitability for installation conditions, span, and weight of shades.
c. Fabric Attachment: Utilize extruded channel in tube to accept vinyl spline welded to fabric edge. Shade band to be removable and replaceable without removing roller tube from brackets or inserting spline from the side of the roller tube.

10. Hembars: Designed to maintain bottom of shade straight and flat.

a. Style: Full wrap fabric covered bottom bar, flat profile with heat sealed closed ends.
b. Style: Exposed aluminum bottom bar with matching finials.

1) Profile: Rectangular.
2) Color: Manufacturer's standard coordinated with shade fabric selected.

c. Room-Darkening Shades: Provide a slot in bottom bar with wool-pile light seal.

11. Accessories:

a. Fascia: Removable extruded aluminum fascia, size as required to conceal shade mounting, attachable to brackets without exposed fasteners.

1) Finish: Fabric wrapped to match shade.
2) Capable of installation across two or more shade bands in one piece.
3) Color: _____.
4) Profile: Square.
5) Configuration: Captured, fascia stops at captured bracket end.
6) Configuration: Continuous, fascia extends past continuous bracket.
7) Configuration: Captured and continuous, as indicated on drawings.

b. Ceiling Pockets: Premanufactured metal shade pocket with removable closure panel, for recess mounting in acoustical tile or drywall ceilings; size and configuration as indicated on drawings.

1) Removable closure panel.
2) 7/8” ceiling tile support.
3) Use 2” closure assembly by Mecho or 2” ceiling tile receiver by others in lieu of 7/8” ceiling tile support where applicable by code (i.e.: projects in seismic zones).

c. Ceiling Pockets with Prewired Raceway:

1) Basis of Design: ElectroPocket; Model _____. As manufactured by MechoShade Systems LLC. UL 325 listed, extruded aluminum shade pocket for recess mounting in acoustical tile or drywall ceilings; size and configuration as indicated on drawings.

a) Removable closure panel.
b) 7/8” ceiling tile support.
c) Use 2” closure assembly by Mecho or 2” ceiling tile receiver by others in lieu of 7/8” ceiling tile support where applicable by code (i.e.: healthcare projects in seismic zones).

2) Designed to accommodate installation of motor control and wiring accessories within pocket including, but not limited to, line voltage disconnect modular connector, MechoNet Wireless Controller, IQ2 Dual Splitter, and non-plenum rated daisy chain wiring.

d. Room-Darkening Channels, Standard: Extruded aluminum side and center channels with brush pile edge seals, SnapLoc mounting base, and concealed fasteners. Channels to accept one-piece exposed blackout hembar to assure side light control and sill light control.
e. ShadeLoc Channels: Extruded aluminum side and center channels consisting of mounting base, SnapLoc channel for capturing zippered edges of shade band, and rubber foam cushions to adjust for field conditions.

2.5 INTELLIGENT ENCODED ELECTRONIC DRIVE SYSTEM

A. Electronic Drive Unit (EDU) System General Requirements:

1. A UL 325 listed solution.

a. Component certification in lieu of system testing is not acceptable.

2. Listing Label and Motor Rating: To be visible for inspection without dismounting of shade assembly to remove motor or EDU from shade roller tube.
3. Size and Configuration: As recommended by manufacturer for type, size, and arrangement of shades.
4. Conceal EDU inside shade roller tube.
5. EDU Rated Speed: The same nominal speed for shades in the same room.
6. Hanging Weight of Shade Band: 80 percent of rated lifting capacity of shade EDU and tube assembly.
7. Capable of upgrading firmware from anywhere on network without touching the motor.

B. Line Voltage EDU (120 VAC):

1. Basis of Design: MechoShade Systems LLC; WhisperShadeIQ2 System. Tubular, asynchronous, integral AC motor and reversible capacitor. 120 VAC, single phase, 60 Hz; temperature Class B, thermally-protected, totally enclosed, maintenance-free. Powered by line voltage power supply connection equipped with locking disconnect plug assembly furnished with EDU.
2. Audible Noise: 46 dBA measured 3 ft (914 mm) from motor unit, depending on motor torque.
3. Nominal Speed: 34 RPM. Not to vary due to load/lift capacity.
4. Isolated, low voltage power supply for powering external accessories connected to either the dry contact or network port.

a. Products requiring accessories to be powered by a plug-in or externally-supplied power supply are not acceptable.

C. Low Voltage EDU (24 VDC):

1. Basis of Design: MechoShade Systems LLC; WhisperShade IQ2-DC System. Tubular, asynchronous, integral DC motor. 24 VDC; temperature Class B, thermally-protected, totally enclosed, maintenance-free. Powered by low voltage power supply connection equipped with disconnect plug assembly furnished with EDU.

2. Audible Noise: 38 dBA measured 3 ft (914 mm) from motor unit, depending on motor torque.
3. Nominal Speed: 10 to 28 RPM. Configurable. Speed managed such that it does not vary due to load/lift capacity.
4. Low voltage power supply for powering external accessories connected to either the dry contact or network port.

    a. Products that require accessories to be powered by a plug-in or externally-supplied power supply are not acceptable.

5. Wireless Controls: Optional built-in two-way wireless EnOcean controls through iQ3-DC-RF motor.
6. Override Mode: Place motor into Override Mode when local switch commands shade to new position.

    a. Local switch command sources:

        1) Keypad connected to EDU dry contact inputs.
        2) Third-party system connected to EDU dry contact inputs.
        3) Network keypad or other device that serially communicates with EDU and configured to issue override commands as if it were a local switch connected to EDU dry contact inputs.

    b. Entering Override Mode: Monitor and log positioning commands from automation devices. Do not act until exiting Override Mode.
    c. Return from Override Mode: Position shade to last commanded position in log.
    d. Automated Return from Override Mode:

        1) Override Return Timer: When Override Mode is entered by changing shade position with local switch as described above, Enable override return timer to make these changes temporary such that automation can regain control of shade after configurable time duration (default of 60 minutes).
        2) Pocket temperature sensor integral to EDU to track pocket temperature.

            When shade is in Override Mode and Heat Gain Sensing is Enabled: Sensor determines when direct sunlight and associated solar heat gain has left the window. When this condition occurs, after the shade has been overridden to cover the window, EDU to return from Override Mode if Override Return Timer has not done so already in order for automation controllers to once again optimize shade position for exposure to daylight.

7. Preventative Maintenance:

    a. Internally monitor important operating parameters to ensure motor and its shade assembly are functioning properly.
    b. Performance Degradation: Provide visual indication via feedback LED and communicate warnings on repetitive basis through its serial port.
    c. Warning Conditions: Logged and queryable. Allow sending of multiple warnings until condition is acknowledged.
    d. Stop shade rotation for parameters of critical concern until reset by trained technician after being serviced.
    e. Devices capable of receiving warnings include SolarTrac automated solar-evaluation control system.

f. Tracked Parameters to include:

1) Operating life (cycles, hours).
2) Pocket temperature.
3) Internal motor temperature.
4) Vibration.
5) Stall.
6) Power reset.
7) Maintenance Mode.
8) Speed regulation.
9) Position targeting.
10) Movement without command.
11) One Bus availability.

g. Detectable Potential Warning Conditions to Include:

1) Assembly vibration/bearing wear warning.
2) Tube/shade assembly drop.
3) Fabric hung-up/telescoping.
4) Motor mount warning.
5) Lifecycle replacement warning.
6) Brake/limit failure.
7) Network warning.
8) Motor internal temperature warning.
9) Pocket temperature warning.

D. Low Voltage Motor by Mecho to operate on Power Over Ethernet (PoE).

1. Intelligent motors controlled and monitored via IP digital network
2. IP Gateway must be supplied to work with overall control system
3. All power delivered to motor directly from UPoE+ switch with minimum of 90 watt output on every port (switch supplied and supported by others)
4. UPoE+ (90W) Shade Controller and MechoNet Hub • Supports IEEE 802.3af, 802.3at, 802.3bt Type 3 or Type 4 POE Network Switches with LLDP. (PoE, PoE+, UPoE, UPoE+ compliant.
5. PoE port power ratios by supporting simultaneous group control of multiple IQ2-DC motors over 1 POE hub.
6. Single network solution across the building for windows of all sizes using both AC and DC motorized shades. POE Hub controls unlimited line voltage AC-powered WhisperShade IQ2 and IQ2+ motorized shades.
7. POE Hub provides access to MechoNet Wireless sensors and keypads through MechoNet MWC+ controllers.
8. Cisco DNA / Smart Building Solutions Partner - Employs CoAP (Constrained Application Protocol) messaging and MUD (Manufacturer Usage Description) for secure, open communication across sub-systems.
9. SolarTrac 4.0 compliant for industry leading automation strategy efficacy and flexibile
10. DC motor according to standards ISO3741 NF 31022 in dBA ref 1pW at nominal Torque without end product < 38 dBA
11. Maximum current draw for each shade LV DC Motor of 1.5 Amps at 24VDC.
12. POE LV DC motor rated speed is 10-25rpm Adjustable
13. Temperature Working Range 32°F to 140°F (0°C to 60°C) (Interior use only)
14. Insulation Class: Class 111
15. Wiring to be all low voltage cat6 to IP Hub from UPOE switch
16. Index Protection Rating: IP 20 (interior)
17. UL Listed FCC and CE compliant

E. POE LV DC Motor System: (software, two-way communication): Specifications and design are based on Intelligent POE motor control system from Mecho. POE performance criteria:

1. POE LV DC Motor shall support two methods of control

    a. Local override wall control for in room manipulation

        1) Controller to work on COAP protocol
        2) User interface via GUI to manage controllers to shades

    b. Network Control

        1) POE Motor shall be equipped with a bi-directional IP network communication capability to support operation of individual or groups of shades over a common IP network via an API.

2. Upper and lower stopping points (operating limits) of shade bands shall be programmed into POE LV DC motors using either a handheld removable program module or MechoNet Programming software.
3. Alignment Positions: Each POE LV DC motor shall support a minimum of 133 repeatable and precisely aligned shade positions (including limits and presets).

    a. All shades on the same switch circuit or with the same network group address with the same opening height shall align at each limit or preset (intermediate stopping position) when traveling from any position, up or down.
    b. Shades of differing heights shall have capability for custom, aligned intermediate stop positions when traveling from any position, up or down.
    c. Alignment of shades mechanically aligned on the same POE LV DC motor shall not exceed +/- 0.125 inches (3.175mm) when commanded to the same alignment position.
    d. Alignment of shades on adjacent POE LV DC motors shall not exceed +/- 0.25” inches (6.35mm) when commanded to the same alignment position.
    e. Local on wall controller:

        1) Upon setting the limits for the shade, POE LV DC motor preset positions shall be capable of IP control to default to 25%, 50% and 75% of the shade travel in addition to standard up and down
        2) These positions shall be capable of being customized.

    f. Network Presets: A minimum of 10 customizable preset positions shall be accessible via network commands.

        1) Upon setting the limits POE LV DC motor these preset positions shall automatically default to the lower limit unless customized elsewhere.
        2) These positions shall be capable of being customized and grouped using the control software.

4. POE LV DC Motor Wiring

    a. One unshielded Twisted CAT-6 or higher from every motor hub location to floor IDF / IT room or as per wiring diagram to plenum rated Cisco switch in zone.
    b. Each wire to meet TIA-568B Standard with Plastic RJ-45 Connectors
    c. Wire to be plenum rated where required by code
    d. Every wire to be machine labeled at each end with a unique identifier.
    e. LV DC Shade motor end to have 12” whip rolled up to allow for shade installation

f. Closet end to be punched down into patch panel (rack location and style to be coordinated in field by GC or end user)
g. Every wire to be certified using Fluke DSX cable analyzer or comparable equipment.
h. Max Distance from Switch to PoE Motor Hub is 225' with 2x14AWG/3x22AWG cable.

F. Modes of Operation:

1. Uniform Mode: Shades move to defined intermediate stop positions in order to maintain aesthetic uniformity.
2. Normal Mode: Shades move to defined intermediate stop positions and any position between defined upper and lower limits.
3. Maintenance Mode: Prevents shade from moving via dry contact or network control commands mode has been cleared/disabled.

G. Control Methods: Local isolated dry contact input and network control.

1. Local Isolated Dry Contact Inputs:

a. Local switch control, third party system integration without separate interface.
b. Moving EDU/shade to upper and lower limits and local switch preset positions.
c. Configuration of upper and lower limits, custom presets, and key modes of operation without a PC or microprocessor-based tools.
d. Configuration under protected sequences to prevent changes by casual user.
e. Switch Personalities: Configuration of dry contact control port over network such that any type of dry contact keypad/third-party interface and actuation methodology (maintained and/or momentary actuation) can be used to operate shade.
f. Dry Contact Control Connection Options to Include:

1) One-button.
2) Two-button.
3) Three-button. Able to support configuring limits, presets, and key operating modes (default).
4) Three-button. No configuration capability to prevent accidental changes in settings.

2. Network Control:

a. Bi-directional network communication to enable commanding operation of large groups of shades over a common backbone.
b. Each EDU:

1) Support eight network addresses capable of being employed for various levels of group control.
2) Dry Contact Ports: Assigned its own local switch address which can be matched by other EDUs within eight network addresses in order to support group control when dry contact commands are received.

a) The EDU receiving dry contact commands may or may not be configured to operate based on commands coming through its own dry contact input port.

3) To have an independent unique identifier address (UID) enabling EDU to be independently controlled and configured over network via handheld configurator and/or PC controller.

c. Network Communication Card: Integral with tubular EDU assembly.
d. Support configuration of upper and lower limits using either a handheld removable program module/configurator or a local switch.
e. Support configuration of addresses using a handheld removable program module/configurator.

H. Alignment Positions:

1. Repeatable and precisely aligned shade positions and limits.

a. Support positioning commands from 0 to 100 percent in 1 percent increments.
b. Customizable Presets: 32.
c. Include three intermediate dry contact presets

2. Shades on same switch circuit or same network group address with same opening height, to align at each intermediate stopping position when traveling from any position, up or down.
3. Shades of differing heights: Capable of custom, aligned intermediate stop positions when traveling from any position, up or down.
4. Alignment of shade bands mechanically aligned on same EDU: Plus or minus 0.125 inch (3 mm).
5. Alignment of standard shades on adjacent EDUs: Plus or minus 0.25 inch (6 mm) when commanded to same alignment position.

I. Local Switch Presets:

1. Minimum of three customizable preset positions accessible over the local dry contact control inputs and over the network connection.
2. Preset positions: Customizable to any position between and including defined upper and lower limits (initially defaults to 25, 50, and 75 percent of shade travel).
3. Configuration of Custom Preset Positions: A handheld removable program module/configurator or a local switch.

J. Network Presets:

1. Minimum of 32 customizable preset positions (including the three local switch presets) accessible via network commands.
2. Preset positions: Customizable to any position between and including defined upper and lower limits (initially defaults to defined lower limit).
3. Configuration of Custom Preset Positions: A handheld removable program module/configurator or a local switch.

2.6 MOTOR CONTROLS, INTERFACES, AND ACCESSORIES

A. Unless indicated to be excluded, provide required equipment as necessary for a complete operating system providing the control intent specified. Provide components and connections necessary to interface with other systems as indicated.

B. Digital Network Controls:

1. Basis of Design: MechoShade Systems LLC; MechoNet. Low-voltage network utilizes standard Category 5/6 UTP cable; maximum of 4,000 feet (1,219 m), 250 nodes.
2. Reprogram control without requiring wiring modifications.
3. Ten-year non-volatile power failure memory for system configuration settings.
4. Network Interface Components:

    a. MechoNet Network Interface; MNI Series: Four configurable motor/EDU ports (models available for RJ45 or terminal block wiring); four configurable switch ports; one infrared (IR) remote control port; one configurable serial port for RS232/RS485 communication.
    b. IQ2 Dual Splitter: Two motor/EDU ports; two switch ports.
    c. IQ/MLC2 Motor Group Controller: Four ports for line-voltage standard (non-intelligent) motors (120 or 230 VAC; 600 W, 1/4 HP maximum).
    d. IQ Gateway; one for each floor where controlling across multiple floors.

C. Low-Voltage Wall Controls; IQ Switch:

1. Momentary dry contact switch enables manual local control or network control of any individual shade motor or shade group/sub-group on MechoNet network.
2. Control Functions:

    a. Open: Automatically open controlled shades to fully open position when button is pressed.
    b. Close: Automatically close controlled shades to fully closed position when button is pressed.
    c. Presets: For selection of predetermined shade positions.
    d. Dual Stations: For individual control of two shades/groups.

3. Finish: White.
4. Single Station: 5-button (open, close, and three intermediate stop positions).
5. Double Station: 10-button (open, close, and three intermediate stop positions for each of two shades/groups).

D. Wireless Controls:

1. MechoNet Wireless Controllers:

    a. Serves as gateway, router, and controller between EnOcean wireless devices and MechoNet network.
    b. Communicates with EnOcean wireless devices via 902 MHz RF. Supports wireless daylight sensors, occupancy/vacancy sensors, and switches.
    c. Controller to manage up to 16 EnOcean wireless devices.
    d. Controller to be configurable to one of two modes of operation:

        1) SolarTrac Mode: Relays EnOcean wireless sensor and control information to SolarTrac automatic solar-evaluation control system.

2) Solar Activated Control Mode: Utilizes EnOcean wireless sensor and control information for internal automation algorithms to adjust shade positions.

a) Adjusts shade positions based daylight sensors input optimizing visual comfort. Enables five shade positions; full-up, full-down, and three configurable intermediate preset stop positions. Default of three positions; full-up, full-down, and preset number two.
b) Configurable daylight thresholds for shade positions. Includes configurable hysteresis setting, default of 20 percent, preventing frequent cycling of shades during fluctuating daylight conditions.
c) Configurable delay timers inhibit shade position changes due to short duration changes in daylight conditions. Default of 300 seconds delay for up, 60 seconds delay for down.
d) Night Mode: Configurable night time shade position to support light pollution, privacy, and/or energy conservation requirements. Configurable daylight threshold. Default of 18.6 footcandles (200 lux), Duration: Default of 60 minutes to enter night mode, 30 minutes to exit night mode.
e) Occupancy/Vacancy: Where wireless occupancy/vacancy sensors are specified, enables configurable unoccupied/vacant mode shade position (default of full-down) to optimize energy conservation. Configurable timers for detection of unoccupied and occupied states.
f) Manual Override: Where local switches are specified. Enables manual temporary override of shade positions for configurable duration. Default of 60 minutes.
g) Retract Mode: Manages changes to light level based on shade position for comfort and increasing exposure of occupant to daylight. Shades move up in stepped one-position increments as daylight levels drop. Each step is maintained for one minute while controller retests daylight conditions before authorizing the next step until target is reached.

e. Capable of being powered by a dedicated low-voltage power supply or through certain MechoNet devices without additional power supplies.
f. Multiple sensors to be configurable to automate the same shade control zone in order to ensure operation based on worst case comfort conditions across the zone.
g. Sensors to be configuralbe to automate multiple shade control zones.
h. Maintain a circular log of previous 48 hours of data received from each of 16 possible wireless devices. Data to be capable of being downloaded and stored for record keeping, performance optimization, or troubleshooting purposes.
i. Wireless Daylight Sensor (SolarTrac Room) Ready when using PoE Motors.

1) EnOcean® 2-way RF transceiver sensor monitors the daylight level and thermal conditions at curtain wall and relays information to IP POE network using EnOcean and COAP protocols. Controller logs and associated data must support analytics and allow for feed information over to Mecho SolarTrac software for whole building automation or be configured to operate shades directly based on local conditions from sensors.
2) Mecho Wireless Controller when deployed on an IP POE network can also receive data and/or commands from other EnOcean devices such as battery less keypads, occupancy sensors, magnetic door and window sensors, lighting controllers, thermostats, etc. Up to 20 wireless EnOcean sensors and/or devices can be hosted by each controller enhancing local operation without adding any cables.

2. Wireless Daylight Sensors (SolarTrac Room):

    a. Monitors daylight through curtainwall and communicates with MechoNet Wireless Controller. Adjusts shade position based on user-defined light thresholds.
    b. Powered by integral photovoltaic cells. No batteries or external power supplies.
    c. Data Transmission:

        1) Provide the following data with each message:

            a) Charge level.
            b) Illuminance: 0 to 6,100 foot-candles (0 to 65,656 lux). Plus or minus 5 percent accuracy.

        2) Transmit message when daylight level changes by three percent.
        3) Transmit "heartbeat" message once per minute during daylight and once per hour at night for determining when maintenance/support is required.

    d. Mountable horizontally, vertically, and upside-down on mullion without screws.

3. Wireless Occupancy Sensors:

    a. Monitor room/area occupancy. Communicate with MechoNet Wireless Controller optimizing shade positions.
    b. Solar-powered with battery backup.
    c. Passive infrared (PIR) sensing.
    d. Ceiling-mounted with 360 degree angle of detection optimized for ceiling height between 8 and 10 feet (2.4 and 3.0 m).

4. Wireless Switches:

    a. Communicates with MechoNet Wireless Controller. Adjusts shade positions based on switch operation.
    b. Enables manual local control or network control of any individual shade motor or shade group/sub-group on MechoNet network.
    c. Self-powered via rocker switch operation.
    d. Finish: White.

5. MechoNet Wireless 0-10v Interface:

    a. Translates the 0-10V command to ElectroShade iQ3-DC-RF motors via EnOcean protocol and lets the dimming value (8-bit) data control shade positions with presets or percentage options.

        1) The default preset levels are 25%, 50%, 75% and full up/down based on the output of the 0-10V Interface or 0-10V Dimmer.
        2) The position levels can also be configured by percentage with a 10% increment based on the output of the 0-10V Interface. The positions can be customized to set 0V and 10V as Full Up or Full Down.

    b. Individual and group motor control based on EnOcean channels or MechoNet addressing.
    c. Wireless EnOcean Communicshashadeation.
    d. Two inout channels supporting 0-10VDC.
    e. Voltage pull-up’s available on the inputs for dry contact applications.
    f. DIN Rail Mount (DIN Rail not included).

g. Cage-clamp style terminal blocks for all wiring connections.
h. LED interface for channel status indication.
i. Available in 902 MHz.
j. Internal and optional external antennae.

E. MechoNet User App Kit – App-Based Motor Control Accessory

1. Description**:** Provide and install the MechoNet™ User App Kit for app-based control of Mecho ElectroShade® iQ™ motorized shading systems. This kit shall integrate MechoNet+ motors into a unified control platform utilizing the Bond Bridge Pro and MechoNet™ Motor Hub.
2. Components**:**

a. Bond Bridge Pro Wi-Fi/Ethernet device
b. MechoNet™ Motor Hub with Ethernet-to-MechoNet+ routing
c. MechoNet+ Terminator and RJ45 T-Connector
d. Low-voltage MechoNet+ cables (24" and 30"
e. Optional Sidekick remote for additional wireless control

3. Functional Requirements:

a. Provide app-based setup and configuration using the Bond Home app on iOS or Android.
b. Enable control of up to 50 MechoNet+ motors per kit (multiple kits required for larger groups).
c. Support scheduling (including astronomical), preset positions, scene-based control, and group shade movement.
d. Enable seamless communication via secure protocols for integration with building control systems.
e. Include LED indicators for real-time status and installation feedback.
f. Provide support for ElectroShade® iQ2+, iQ2-DC, iQ3-DC, and iQ3-DC-RF motors.
g. Mounting hardware to support wall, ceiling, or backing board installations as required.

4. Connectivity Requirements:

a. Bond Bridge Pro must connect to a 2.4 GHz Wi-Fi network.
b. Device and smartphone must be on the same network during setup.
c. Not compatible with WPA-Enterprise or captive portal networks.
d. Confirm SSID and network readiness with client prior to installation.

5. Notes:

a. Kit must comply with UL4200A safety standards.
b. Handle components using proper electrostatic discharge (ESD) precautions.
c. Installer to coordinate motor addressing and app configuration using MPS prior to commissioning.

2.7 SHADE FABRIC

A. Basis of Design: Shade fabric as manufactured by MechoShade Systems LLC.

1. Solar Shadecloths:

a. Fabric: EcoSheer: 6750 series. Cradle to Cradle Certified, woven 100 percent polyester, PVC-free, reversible face, (3 percent open). The first shadecloth to pass NFPA 701 flame tests without added chemical flame retardants.

1) NRC Rating: 0.15.
2) SAA Rating: 0.19.
3) Low-Emitting Material Certification: Greenguard Gold certified and listed in UL (GGG).
4) Health Product Declaration (HPD): Published declaration with full disclosure of known hazards.
5) Cradle to Cradle Material Health Certificate:
6) Achievement Level: Bronze.
7) Declare label.
8) Environmental Product Declaration (EPD): Published disclosure of product's environmental impacts based on a full Life Cycle Assessment (LCA). Manufacturer must have EPD certification by independent 3rd party evaluation service.

b. Color: Selected from manufacturer's standard colors.

2. Performance Requirements:

a. Flammability per NFPA 701: Pass. Large or small scale test.
b. Fungal Resistance: No growth when tested per ASTM G21.
c. Cleanability and Disinfecting: ShadeCloth must meet cleanability and disinfecting requirements via 3rd party testing to comply with BIFMA HCF 8.1-2014 standards using chemical solutions compliant with EPA guidelines for use against COVID-19.

3. Fabrication:

a. Fabric Orientation: Railroaded, fabric is turned 90 degrees off the roll.
b. Battens: Manufacturer's standard material, full width of shade, and enclosed in welded shade fabric pocket; locate as indicated on drawings.
c. Seams for Railroaded Fabric: Manufacturer's standard seam; locate as indicated on drawings.
d. Welded Zipper Edge: Full height on both sides of fabric ensuring smooth operation within ShadeLoc channels.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Start of installation shall be considered acceptance of substrates.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using methods recommended by manufacturer for achieving best result for substrate under the project conditions.

C. Coordinate with window installation and placement of concealed blocking to support shades.

3.3 SYSTEM STARTUP

A. Motorized Shade System: Provide services of a manufacturer's authorized representative to perform system startup.

B. Turn-Key Single-Source Responsibility for Motorized Interior Roller Shades: Design, engineering, and installation of motorized roller shade systems, motors, controls, and low voltage electrical control wiring specified is to be performed by a single manufacturer and their authorized installer/dealer.

1. The Architect will not provide a set of electrical drawings for installation of control wiring for motors, or motor controllers of motorized roller shades.
2. General Contractor (GC) To Provide the Following:

    a. Power Panels and Circuits: Size to accommodate roller shade manufacturer's requirements, as indicated on mechanical and electrical drawings.
    b. Coordinate with requirements of roller shade installer/dealer, before inaccessible areas are constructed.
    c. Line voltage as dedicated home runs, of sufficient quantity, and capacity as required. Terminate in junction boxes at locations designated by roller shade installer/dealer.
    d. Run line voltage from terminating points to motor controllers. Wire roller shade motors to motor controllers.

        1) Above-ceiling and concealed wiring to be plenum-rated, or in conduit, as required by the electrical code having jurisdiction.

    e. Use conduit with pull wire in areas, not accessible to roller shade contractor due to building design, equipment location or schedule.
    f. Verify that wiring conditions, which have been previously installed under other sections or at a previous time, are acceptable for product installation in accordance with manufacturer’s instructions.
    g. Comply with manufacturer’s current product data, including shop drawings, technical bulletins, product catalog installation instructions, and product carton instructions for installation.
    h. Protect installed product and finished surfaces from damage during all phases of installation including preparation, testing, and cleanup.
    i. Be responsible for all other required electrical work including but not limited to roof penetrations, conduits, fireproofing, etc.
    j. Provide conduit with pull wire in all areas, which might not be accessible to subcontractor due to building design, equipment location or schedule.

3. Window Covering Subcontractor (WC) responsibilities:

   a. Shade Control Subcontractor shall furnish, install and fully program shade controllers, interfaces, splitters, coupler, sensors, switches, etc. mounted on the wall, in the ceiling, in shade pocket, etc.. Locations for all visible devices to be coordinated with Architect. The shade control subcontractor shall inspect all material included in this contract prior to installation. Manufacturer shall be notified of unacceptable material prior to installation.
   b. Run low voltage control wiring from motor controllers to switch/control locations designated by Architect.

      1) Above-ceiling and concealed wiring to be plenum-rated, or in conduit, as required by the electrical code having jurisdiction.

C. Integration with 3RD Party Systems:

1. Main contractor shall coordinate and provide for others to furnish, install or program any interfaces or wiring to integrate 3rd party systems to the roller shade control system as specified herein. Integration to shade control network can be accomplished locally through IP via UPOE switch with minimum of 60w output per port.

3.4 INSTALLATION

A. Contractor Furnish and Install Responsibilities:

1. Window Covering Contractor (WC) shall provide an on site, Project Manager, and shall be present for all related jobsite scheduling meetings.
2. WC shall supervise the roller shade installation, and setting of intermediate stops of all shades to assure the alignment of the shade bands within a single EDU group, which shall not exceed +/- 0.125 inches (3.175mm), and to assure the alignment between shade groups, which shall not exceed +/- 0.25” inches (6.35mm).
3. WC shall be responsible for field inspection on an area-by- area and floor-by-floor basis during construction to confirm proper mounting conditions per approved shop drawings.
4. Verification of Conditions: examine the areas to receive the work and the conditions under which the work would be performed and notify General Contractor and Owner of conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected. Commencement of installation shall constitute acceptance of substrate conditions by the installer.
5. WC shall provide accurate to 0.0625” inch (1.5875mm); field measurements for custom shade fabrication on the Roller Shades manufacturers input forms.
6. WC Installer shall install roller shades level, plumb, square, and true according to manufacturer’s written instructions, and as specified here in. Blocking for roller shades furnished and installed under the contract of the interior General Contractor shall be installed plumb, level, and fitted to window mullion as per interior architect’s design documents and in accordance with industry standard tolerances. The horizontal surface of the shade pocket shall not be out-of-level more than 0.625” (15.875mm) over 20 linear feet (6.096 meters)
7. Shades shall be located so the shade band is not closer than 2 inches (50 mm) to the interior face of the glass. Allow proper clearances for window operation hardware.
8. Adjust, align and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.
9. Installer shall set Upper, Lower and up to 3 intermediate stop positions of all motorized shade bands, and assure alignment in accordance with the above requirements.

10. WC shall certify the operation of all motorized shades and turn over each floor for preliminary acceptance.
11. The WC shall participate and cooperate with the electrical, low voltage and commissioning agent to verify and certify the installation is in full conformance with the specifications and is fully operational. This work to occur during the commissioning stage and is in addition to preliminary acceptance required for each floor.
12. Clean roller shade surfaces after installation, according to manufacturer's written instructions.
13. WC shall train Owner's maintenance personnel to adjust, operate and maintain roller shade systems.

    a. Use operation and maintenance manual as a reference, supplemented with additional training materials as required.

3.5 PROTECTION AND CLEANING

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

1. Clean soiled shades and exposed components as recommended by manufacturer.
2. Replace shades that cannot be cleaned to "like new" condition.

3.6 MAINTENANCE

A. Provide Owner a proposal as an alternate add to the base bid, a separate renewable maintenance contract for service and maintenance of motorized shade system.

1. Include a complete description of preventive maintenance, systematic examination, adjustment, parts and labor, cleaning, and testing, with a detailed schedule.

    a. Contract Duration: One year from date of Substantial Completion.

B. Automated Solar-Tracking Control Systems: Provide Owner a proposal as an alternate add to the base bid, a separate renewable software maintenance contract.

1. Contract Duration: One year from date of Substantial Completion.

END OF SECTION 12 24 13

SECTION 12 35 00

CASEWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes

1. Plastic-laminate faced wood modular casework.

a. See Drawing A909, "Interior Details" for the following:

1) Reception Counter.
2) Full Height Cabinet.

b. See Drawing A910, "Interior Details" for the following:

1) Casework Lower Cabinet.
2) Casework Upper Cabinet.
3) Lavatory Counter.

B. Related Requirements:

1. Section 06 10 00, “Rough Carpentry;” wood blocking.
2. Section 12 36 61, “Solid Surfacing Countertops.”

1.3 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

B. Scheduling and Coordination:

1. Require casework fabricator to examine the schedule and check it for timing, accuracy and compatibility with its work and shall coordinate work with the master schedule and job superintendent.

2. Require casework fabricator to furnish assistance in coordination and scheduling of other work pertinent to casework installation and to notify Contractor of requirements so as to result in a well-coordinated job.

1.4 ACTION SUBMITTALS

A. Shop Drawings: Dimensioned plans, elevations, component profiles, and details for each casework layout.

B. Product Data: Manufacturer's literature describing casework demonstrating compliance with these Specifications.

C. Samples:

1. Typical door and drawer panels in specified veneer and finish.
2. One complete typical upper and lower cabinet unit with hardware. Prepare and submit after review and acceptance of door and drawer panel submittals.

1.5 CLOSEOUT SUBMITTALS

A. Specified warranty.

1.6 QUALITY ASSURANCE

A. General:

1. Furnish all components and accessories and all allied products new and free from defects.
2. To assure proper coordination and eliminate divided responsibility, all work specified in this Section shall be executed under the direction of a single supplier.

B. Casework shall be manufactured to equal or exceed the standards established in ANSI/KCMA A161.1, "Recommended Construction & Performance Standards for Kitchen and Vanity Cabinets." Comply with Drawing and Specification requirements that conflict with or augment this standard and indicate this information on required submittals.

C. Installer Qualifications:

1. Supply an adequate number of skilled workers, thoroughly trained, experienced, and familiar with the necessary crafts and methods needed for proper performance of the work of this Section and to provide installation at the rate required by the approved Construction Schedule.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery times and storage locations shall be coordinated so there is no delay in the work and the installation is completed on schedule.

B. Comply with additional requirements specified in Section 01 60 00, "Product Requirements."

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install casework until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.

B. Field Measurements: Where casework is indicated to fit to existing construction, verify dimensions of existing construction by field measurements before fabrication and indicate measurements on Shop Drawings. Provide fillers and scribes to allow for trimming and fitting.

C. Locate concealed framing, blocking, and reinforcements that support casework by field measurements before enclosing them, and indicate measurements on Shop Drawings.

1.9 WARRANTY

A. Manufacturer: Furnish to Owner a written warranty for residential casework and operating hardware against all defects in materials for 5-years from date of acceptance.

PART 2 - PRODUCTS

2.1 SUSTAINABLE DESIGN REQUIREMENTS

A. Sealants applied inside of the waterproofing barrier of the building shall have VOC content equal to or less than the applicable VOC limits.

B. Materials shall contain no added urea formaldehyde.

C. Provide materials with the highest levels of post-consumer and pre-consumer recycled content.

2.2 MATERIALS

A. Panels:

1. General: Panel thicknesses shall be in accordance with NAAWS requirements for each location of use, span, and casework Grade.
2. End, Top, and Bottom Panels:

    a. Hardwood Plywood: HPVA HP-1.

3. Door and Drawer Faces:

    a. CFC Combination core: Veneer core consisting of Western softwood inner core, with outer plies on both faces consisting of medium density fiberboard (MDF) resulting in a smooth laminating surface with minimal telegraphing; 7-ply for 3/4 inch thickness; “SkyPly Combination Fiber Core CFC Veneer Core panels with no added urea-formaldehyde” by Roseburg, or equal.
    b. Door and Drawer Face Style: Flush overlay; faces cover cabinet fronts.

4. Particle Board: Not permitted.

B. Plastic Laminate:

1. High-pressure decorative laminate complying with NEMA LD 3:

a. Manufacturers:

1) Formica Corporation, Nevamar Company LLC.
2) Fenix, https://www.fenixforinteriors.com/en/contacts/request-information.

b. Exposed Cabinet Materials: Plastic Laminate Grade VGS.
c. Semi-exposed Cabinet Materials: Thermoset decorative panels composed of CFC Combination core finished with thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.
d. Style/Finish: see Finish Schedule, drawing A304, keynotes **PL-1**, and **PL-2**.
e. Color/Pattern: see Finish Schedule, drawing A304, keynotes **PL-1**, and **PL-2**.

2. Edgebanding for Plastic Laminate: Unless otherwise indicated, provide specified edge-banding on all exposed edges.

a. 1mm PVC banding, machine applied.
b. 3mm PVC banding, machine applied and machine profiled to 1/8 inch radius.
c. Edgebanding locations:

1) Cabinet bodies with Door/Drawer face: 3mm PVC.
2) Cabinet shelves with Door face: 1mm PVC on front edge only.
3) Cabinet Door/Drawer faces: 3mm PVC.

d. PVC Color Selections: matched to laminates.

C. SOLID SURFACING COUNTERTOPS

1. See specification Section 12 36 61, “Solid Surfacing Countertops.”

2.3 CONSTRUCTION:

A. Cabinet Style: Face Frame.

1. Front Frame:

a. 3/4” thick kiln dried solid hardwood. Bore and dowel or pocket screw construction frame joinery reinforced with glue and nail. Stiles 1-1/2” wide. Mulls 3” wide. Rails 1-3/4” wide. Stiles and top and bottom rails dadoed to receive ends, tops, and bottoms.

2. End Panels:

a. Nominal 1/2" thick, multi-ply Type 1 exterior glue hardwood plywood, dadoed to receive tops and bottoms. Ends are inserted into dado in face frame and recessed 3/16” and rabbeted to receive backs.

3. Top/Bottom Panels:

    a. Nominal 1/2" thick multi-ply hardwood plywood. Tops and bottoms let into end panels, front rails, and hang rails glued and stapled. Bottoms are supported at rear of base cabinets by nominal 1/2" thick multi-ply hardwood plywood.

4. Hanging Rails:

    a. Wall cabinets have nominal 3/4" thick x 3” high multi-ply hardwood plywood, running the full cabinet length at top and bottom. Base cabinets have nominal 3/4" thick x 7-1/4” high solid pine at the top. All hang rails are rabbeted to insert in end panels and to receive backs.

5. Back Panel:

    a. Nominal 1/4” thick hardwood plywood. Securely glued and stapled to rabbets in end panels and hang rails.

6. Shelves:

    a. Nominal 1/2" thick multi-ply hardwood plywood.

7. Toe Board:

    a. Fabricate from solid Marine Grade plywood, 3/4" thick.

8. Base I-Beam Braces:

    a. Two 1/2" thick x 3” wide plywood braces running full-depth front to back of cabinet, recessed down 1” from top. All braces are glued and stapled at top of cabinet to front frame and hang rail, and dadoed into end panel.

9. Drawer:

    a. Front, back, and sides 5/8” thick solid hardwood with dovetail construction. Drawer bottoms are nominal 1/4" thick multi-ply hardwood Birch plywood inserted and stapled into dado in front, back, and sides.

2.4 HARDWARE

A. General: Manufacturer's standard units complying with BHMA A156.9, of type, size, style, material, and finish as selected by Architect from manufacturer's full range.

B. Finishes:

1. Exposed Items: Satin chromium plated.
2. Concealed Items: Manufacturer's standard.

C. Hinges: Concealed European-style, self-closing hinges.

D. Drawer Slides: Quiet type with nylon ball-bearing rollers; positive pull-out stop; self-closing, concealed under mounting;

E. Drawer and Door Pulls: Wire Type, metal, 4-inches long, satin chrome finish.

F. Drawer Guides: Epoxy-coated-metal, self-closing drawer guides; designed to prevent rebound when drawers are closed; with nylon-tired, ball-bearing rollers; and complying with BHMA A156.9, Type B05011 or Type B05091.

G. Hinges: Totally concealed, three-way adjustable, self-closing, opening to 120 degrees.

H. Shelf Supports, End Supported: Clips for insertion into 5mm or 1/4 inch holes.

I. Bumper Pads (Silencers): Clear plastic.

1. Doors: Provide one bumper at top and bottom of closing edge of each swinging door.
2. Drawers: Provide one bumper on back side of drawer front at each corner.

J. Latches: Magnetic.

2.5 FABRICATION

A. General:

1. Construction shall conform to joinery requirements of referenced ANSI/KCMA standard, except as otherwise specified.
2. Provide backs for all cabinets. Back, top, and bottom shall be set within the carcass end panels.
3. Toe space shall be 3 inches deep and 4 inches high.
4. There shall be no exposed particleboard in the completed cabinets. Provide Melamine finish at all semi-exposed surfaces.
5. Backs of doors shall be considered exposed.

B. Construction Type: See Drawings for details.

C. Install hardware and adjust for proper alignment and operation.

D. The following accessory items and features shall be provided:

1. Matching end panels for exposed ends of upper and lower cabinets.
2. Interior cabinet accessories where shown.
3. Removable sink base cabinets per accessibility requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances, location of framing and reinforcements, and other conditions affecting performance of casework.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Surfaces which are not acceptable shall be brought to the attention of the Contractor.

3.2 INSTALLATION

A. Install cabinetwork plumb and level to a tolerance of 1/8 inch in 8 feet in accordance with manufacturer's printed installation instructions and reviewed shop drawings.

1. Fasten base cabinets to floor at toe space and to walls at 24 inches on center maximum.
2. Secure upper cabinets to walls with screws penetrating studs or solid backing.
3. Manufacturer's standard wall cabinet mounting, adjustable pedestal, and clip on base systems are acceptable if complying with the requirements specified herein.
4. Include at least one screw of sufficient length per nailer per stud (total of 2 screws per stud). Install mounting screws in accordance with details on the Drawings.
5. Screw cabinets together to assure a tight fit.

B. Scribe tops and sides of cabinets for a uniform appearance. Include fillers, panels, corner pieces, corner base molding for casework. Exposes surfaces shall be finished.

C. Fasten casework to adjacent units and to backing.

1. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches O.C.

a. Fasteners: No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips.

D. Include special attention to detailing miter joints, finishes, cut-outs and similar conditions for a neat, plumb, and level installation. Provide notching and slotting for plumbing and electrical work.

E. Fill nail holes with filler to match cabinet stain or color.

3.3 INSPECTION AND ACCEPTANCE

A. Test all operating parts and adjust to achieve smooth, quiet operation.

B. Adjust hardware so doors and drawers are centered in openings and operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

C. After installation, wipe finished surfaces to remove marks of handling, and leave in clean condition.

D. Damaged, stained, scratched, or otherwise disfigured portions of the work shall be touched up, refinished, or replaced at no additional cost.

END OF SECTION 12 35 00

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SECTION 12 36 61

SOLID SURFACING COUNTERTOPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes

1. Quartz agglomerate surfacing countertops, with matching splashes.

B. Related Requirements:

1. Section 06 10 00, "Rough Carpentry," for support framing.
2. Section 07 92 00, "Joint Sealants."
3. Section 12 35 00, “Casework.”
4. Plumbing: Division 22.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

1.4 REFERENCES

A. American National Standards Institute (ANSI) and International Cast Polymer Association (ICPA):

1. ANSI/ICPA SS-1, "Performance Standard for Solid Surface Materials."

B. International Solid Surfacing Fabricators Association (ISSFA):

1. ISSFA-2, "Classification & Standards Publication of Solid Surfacing Material."

1.5 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

1.6 ACTION SUBMITTALS

A. Shop Drawings:

1. Dimensioned, to-scale plans and elevations showing details of fabrication, seams, edging, lavatory or sink installation, fastener types and locations, sealant, and method of attachment.
2. Identify color and pattern of solid surfacing for each location and type.
3. Coordinate preparation of shop drawings with casework interfacing with solid surfacing countertops.

B. Product Data: Manufacturer’s descriptive literature and test reports substantiating that solid surfacing meets specified requirements.

C. Samples:

1. Minimum 6-inch-square piece of each pattern and color. Where applicable, indicate full range of color and pattern variation.
2. Counter edge, 6-inches long, in required profile.

1.7 INFORMATIONAL SUBMITTALS

A. Statement of fabricator qualifications.

B. Evidence of certification of installer by manufacturer.

1.8 CLOSEOUT SUBMITTALS

A. Extended warranty.

B. Manufacturer's recommended care and maintenance recommendations including recommended repair and cleaning instructions.

1.9 QUALITY ASSURANCE

A. Fabricator Qualifications: Certified by manufacturer of solid surfacing as an acceptable fabricator and installer.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver products until wet work, painting, and similar operations in storage and installation areas which could damage or soil work have been completed.

B. Store in racks in near-vertical position away and from direct exposure to sun. Store with finished face toward finished face.

C. Comply with additional requirements specified in Section 01 60 00, "Product Requirements."

1.11 WARRANTY

A. Provide manufacturer's extended 10-year warranty against defects in materials, fabrication, and installation. Warranty shall provide material and labor to repair or replace defective materials.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General:

1. Solid surfacing: Materials shall conform to ICPA SS-1.
2. Quartz Agglomerate: Solid sheets consisting of up to 93 percent quartz aggregate combined with polyester resin binders and proprietary pigments that are fabricated using vacuum vibrocompaction technology.
3. See keynotes **QZ-1, QZ-2 and QZ-3** on Drawing A304, “Finish Schedule.”

    a. **QZ-1** Manufacturer: Daltile.
    b. **QZ-2** Manufacturer: Daltile.
    c. **QZ-3** Manufacturer: Cosentino.

4. Thickness: See Finish Legend for thickness.
5. Size: See Finish Legend for sizes; slabs shall be sized to minimize number of joints in installation.
6. Color: see Finish Legend.

2.2 ACCESSORIES

A. Mounting Adhesive:

1. Solid Surfacing Adhesive: Structural-grade silicone or epoxy of type recommended by manufacturer for application and conditions of use.
2. Quartz Agglomerate Adhesive: Methacrylate-based adhesive for chemically bonding quartz surfacing seams. Color complementary to quartz surfacing sheet material. UL 2818 GREENGUARD Gold certified and complying with SCAQMD Rule 1168; “Wilsonart Hard Surface Adhesive” by Wilsonart LLC.

B. Panel Joint Adhesive: Manufacturer's standard two-part epoxy or polyester to create flush, inconspicuous, monolithic, non-porous joints with a chemical bond.

C. Sealant:

1. Mildew-resistant silicone sealant for filling gaps between countertops and terminating substrates in wet environment applications. Complies with ASTM C920, Type S (single component), Grade NS (nonsag); “Wilsonart; Color Matched Caulk” by Wilsonart LLC.

D. Mounting Hardware:

1. Fixtures: Manufacturer's approved bowl clips, brass inserts, and fasteners.
2. Surfacing: Type and size as required and recommended by surfacing manufacturer.

2.3 FABRICATION

A. Comply with applicable requirements of ISSFA-2 and printed instructions of manufacturer including those for treating cut edges, sanding, polishing, seaming and layering.

B. Obtain field measurements, and verify dimensions before fabricating work.

C. Fabricate to dimensions, profiles, and details indicated on the Drawings.

1. Use a single piece wherever possible. Where multiple sheets are required, use sheets in consecutive order as numbered by manufacturer.
2. Precut openings for applied fixtures and fittings, where possible. Cutouts shall be smooth and uniform without saw marks.
3. Predrill mountings for applied hardware, where possible.
4. Conceal all fasteners.

D. To greatest extent possible, complete fabrication and assembly before shipment to site.

1. Disassemble components only as necessary for shipment and installation.
2. Where necessary for fitting at site, provide extra borders and edges to allow scribing and trimming to fit.

E. Provide joints only were maximum available lengths or countertop configuration requires a joint.

1. Install joints where shown on reviewed shop drawings, in accordance with manufacturer's instructions.
2. Joints shall be hard seamed. Provide 2-inch-wide seam blocks under seams in accordance with manufacturer's recommendations.
3. Seal seams with specified joint adhesive, clamp tightly, and sand smooth.
4. Finished joints shall be flush, monolithic, uniform, and nearly invisible.

F. Fabricate countertops with integral front edge with profile shown on the Drawings, and with small-radius coved back and end splashes.

G. Allowable Tolerances:

1. Variation in Component Size: Plus or minus 1/4 inch.
2. Location of Openings: Plus or minus 1/4 inch from indicated position.

PART 3 - EXECUTION

3.1 PREPARATION

A. Verify that backing has been installed at appropriate locations for anchorage.

B. Examine shop-fabricated work for completion. Complete work as required.

3.2 INSTALLATION

A. Install countertops conforming to Manufacturer's recommended installation procedures. Set tops on supports. Anchor using fasteners shown on reviewed shop drawings.

B. If field joints are required, make them in same manner as shop joints. Finished joints shall be flush, monolithic, uniform, and nearly invisible.

C. Scribe and cut to fit adjoining work.

D. Install work plumb, level, true, and straight, with no distortions. Install with no variation in flushness of adjoining surfaces. Shim as required, using concealed shims.

E. Sealant:

1. Use silicone sealant to attach back and end splashes, and to seal joints around plumbing fixtures.

F. Install sealant as specified in Section 07 92 00, "Joint Sealants," as required to close any small unavoidable gaps between counter and abutting surfaces. Sealant shall not be used to correct excessive joint size or scribing errors.

3.3 REPAIRS

A. If permissible to Architect, minor surface marring for solid surfacing components may be repaired according to manufacturer’s published installation instructions.

B. Remove and replace solid surfacing components that are damaged and cannot be satisfactorily repaired.

3.4 ADJUSTMENT, CLEANING, AND PROTECTION

A. Clean solid surfacing components according to manufacturer’s published maintenance instructions. Completely remove excess adhesives and sealants from finished surfaces.

B. Protect completed work from damage during remainder of construction period.

END OF SECTION 12 36 61

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SECTION 12 48 00

ENTRANCE GRATES AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Recessed entrance grating and frame.

B. Related Requirements:

1. Section 03 30 00, "Cast-in-Place Concrete."

1.3 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

1. Action and Informational Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, "Closeout Procedures" and Section 01 78 34, "Warranties."

1.4 ACTION SUBMITTALS

A. Shop Drawings: Show layout and installation details of grates and frames for each location. Coordinate shop drawing submittal with concrete work to ensure proper placement of mat frame and drainage provisions. Shop drawings shall be of sufficient detail to show spline locations, profiles, anchors and accessories.

B. Product Data: Manufacturer's descriptive literature for grate, frame, and recommended installation and maintenance instructions.

C. Samples: Submit an assembled section of floor mat/grid and frame members with selected tread insert showing each type of color for exposed floor mat/grid, frame and accessories required, not less than 12 inches by 12 inches.

D. Maintenance data in the form of manufacturer's printed instructions for cleaning and maintaining floor mats/grids.

1.5 INFORMATIONAL SUBMITTALS

A. Certified test reports showing compliance with specified performance characteristics and physical properties of grating.

1.6 CLOSEOUT SUBMITTALS

A. Cleaning and maintenance data. Include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance.

B. Extended warranty.

1.7 QUALITY ASSURANCE

A. Fire Resistance Ratings:

1. Flammability in accordance with ASTM E 648, Class 1, Critical Radiant Flux, minimum 0.45 watts/square meter.

B. Slip resistance:

1. Slip resistance in accordance with ASTM D 2047-96, Coefficient of Friction, minimum 0.60 for accessible routes.

C. Load Bearing Capacity:

1. Standard rolling load performance to be 1000 lb./wheel (load applied to a solid 5” x 2” wide polyurethane wheel, 1000 passes without damage).

D. Installed foot gratings shall be ADA compliant.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the project site ready for use and fabricated in as large sections and assemblies as practical, in unopened original factory packaging clearly labeled to identify manufacturer.

B. Comply with additional requirements specified in Section 01 60 00, "Product Requirements."

1.9 WARRANTY

A. Manufacturer: Furnish Owner a written warranty for gratings and frames against all defects in materials and workmanship for 5-years from date of acceptance.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum (ASTM B 221) Aluminum alloy 6105-T5, 6105-T6 for extrusions.

B. Flexible and prime EPDM extrusions.

2.2 MANUFACTURERS

A. Manufacturer and Product: "PediTred LP G3" by Construction Specialties as specified and the basis of design, or equal.

B. Floor Mats:

1. Depth: 3/4 inch deep tread rails joined by an EPDM hinge and cushion to compromise the overall grid length (traffic direction).
2. Hinge: The hinge shall be complete with perforations between each tread rail for drainage, unless otherwise specified.
3. Finish: Heavy-duty powder coat finish.
4. Color: As selected by Architect from Manufacturer’s standard range.

C. Mat Frames: Aluminum Frame, model “Recessed Tapered Angle Frame” by Construction Specialties.

1. Rcessed Angle Base Frame: 1/2 inch deep recessed frame in 6063-T6 aluminum alloy.
2. Filler Trim: Black EPDM filler trims, furnished as required. Installer shall use recommended latex screed to ensure level base.
3. Frame Color: Heavy-duty powder coat finish.
4. Color: As selected by Architect from Manufacturer’s standard range.

D. Tread Inserts: Heavy-duty carpet by Construction Specialties.

1. Fiber Material:

a. Solution dyed construction of polypropylene fibers with 50/50 blend of 600/12-denier multi filament and 595/D1 monofilament, with ultraviolet blockers and color as an integral part of the filament.
b. Each carpet fiber and monofilament shall be fusion-bonded to a rigid two-ply backing to prevent fraying and supplied in continuous splice-free lengths.
c. Fibers shall be waterproof and resistant to degradation, fading, and staining.

2. Carpet weight shall be 32-oz./square yard;
3. Color: Hearty Moss 7319.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces scheduled to receive grating for deviations beyond allowable tolerances. For proper installation, the concrete recess must be flat and smooth throughout.

B. Check that dimensions of completed recesses conform to grate sizes. If the recess is formed by a concrete contractor, the pour dimensions may require leveling grout to achieve the proper depth and a smooth finish. The final recess depth will match the specified product and must be field verified. For proper frame installation, the side walls of the concrete recess must also be straight and smooth.

C. Inconsistencies with the recess and side walls must be remediated prior to product installation. Do not begin installation until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Install the work of this section in strict accordance with the manufacturer's recommendations.

B. Set mat at height recommended by manufacturer for most effective cleaning action

C. Coordinate top of mat/grid surfaces with bottom of doors that swing across to provide ample clearance between door and mat.

3.3 CLEANING

A. Provide maintenance schedule that includes regular vacuuming and extraction that correctly matches the amount of traffic the mat incurs.

3.4 PROTECTION

A. After completing required frame installation and concrete work, provide temporary filler of plywood or fiberboard in recess, and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and project is near time of substantial completion.

B. Do not set grating until just prior to final acceptance of the work.

1. Install in accordance with manufacturer's written instructions.
2. Fit neatly into recess with correctly aligned edges.

END OF SECTION 12 48 00

SECTION 26 05 00

GENERAL ELECTRICAL REQUIREMENTS

PART 1 – GENERAL

1.01 DESCRIPTION OF WORK:

A. The work of this Section consists of providing all required labor, supervision, materials and equipment to satisfactorily complete all electrical installations that are shown on the Drawings, included in these specifications, or otherwise needed for a complete and fully operating facility.

B. Furnish and install all required in-place equipment, conduits, conductors, cables and any miscellaneous materials for the satisfactory interconnection and operation of all associated electrical systems.

1.02 RELATED WORK:

A. This Section provides the basic Electrical Requirements which supplement the General Requirements of Division 01 and apply to all Sections of Division 26.

1.03 SUBMITTALS:

A. As specified in Division 01. Submit to the Architect shop drawings, manufacturer's data and certificates for equipment, materials and finish, and pertinent details for each system specified. Information to be submitted includes manufacturer's descriptive literature of cataloged products, equipment, drawings, diagrams, performance and characteristic curves as applicable, test data and catalog cuts. Obtain written approval before procurement, fabrication, or delivery of the items to the job site. Partial submittals are not acceptable and will be returned without review. Furnish manufacturer's name, trade name, catalog model or number, nameplate data, size, layout dimensions, capacity, project specification and paragraph reference, applicable Federal, Industry and Technical Society Publication References, and years of satisfactory service of each item required to establish contract compliance. Photographs of existing installations and data submitted in lieu of catalog data are not acceptable and will be returned without approval.

B. Organize submittals for equipment and items related to each specification section together as a package.

C. Proposed substitutions of products will not be reviewed or approved prior to awarding of the Contract.

D. Substitutions shall be proven to the Architect or Engineer to be equal or superior to the specified product. Architect’s decision is final. The Contractor shall pay all costs incurred by the Architect and Engineer in reviewing and processing any proposed substitutions whether or not a proposed substitution is accepted.

E. If a proposed substitution is rejected, the contractor shall furnish the specified product at no increase in contract price.

F. If a proposed substitution is accepted, the contractor shall be completely responsible for all dimensional changes, electrical changes, or changes to other work which are a result of the substitution. The accepted substitution shall be made at no additional cost to the owner or design consultants.

1.04 QUALITY ASSURANCE:

A. Codes: All electrical equipment and materials, including installation and testing, shall conform to the latest editions following applicable codes:

1. California Electrical Code (CEC).

2. Occupational Safety and Health Act (OSHA) standards.

3. All applicable local codes, rules and regulations.

4. Electrical Contractor shall posses a C-10 license and all other licenses as may be required. Licenses shall be in effect at start of this contract and be maintained throughout the duration of this contract.

B. Variances: In instances where two or more codes are at variance, the most restrictive requirement shall apply.

C. Standards: Equipment shall conform to applicable standards of American National Standards Institute (ANSI), Electronics Industries Association (EIA), Institute of Electrical and Electronics Engineers (IEEE), and National Electrical Manufacturers Association (NEMA).

D. Underwriter Laboratories (UL) listing is required for all equipment and materials where such listing is offered by the Underwriters Laboratories. Provide service entrance labels for all equipment required by the NEC to have such labels.

E. The electrical contractor shall guarantee all work and materials installed under this contract for a period of one (1) year from date of acceptance by owner.

F. All work and materials covered by this specification shall be subject to inspection at any and all times by representatives of the owner. Work shall not be closed in or covered before inspection and approval by the owner or his representative. Any material found not conforming with these specifications shall, within 3 days after being notified by the owner, be removed from premises; if said material has been installed, entire expense of removing and replacing same, including any cutting and patching that may be necessary, shall be borne by the contractor.

1.05 CONTRACT DOCUMENTS:

A. Drawings and Specifications:

1. In the case of conflict between the drawings and specifications, the specifications shall take precedence.

2. Drawings and specifications are intended to comply with all law, ordinances, rules and regulations of constituted authorities having jurisdiction, and where referred to in the Contract Documents, said laws, ordinance, rules and regulations shall be considered as a part of said Contract Documents within the limits specified. The Contractor shall bear all expenses of correcting work done contrary to said laws, ordinance, rules and regulations if the Contractor knew or should have known that the work as performed is contrary to said laws, ordinances, rules and regulations and if the Contractor performed same (1) without first consulting the Architect for further instructions regarding said work and/or (2) disregarded the Architect’s instructions regarding said work.

B. Drawings: The Electrical Drawings shall govern the general layout of the completed construction.

1. Locations of equipment, panels, pullboxes, conduits, stub-ups, ground connections are approximate unless dimensioned; verify locations with the Architect prior to installation.

2. Review the Drawings and Specification Divisions of other trades and perform the electrical work that will be required for those installations.

3. Should there be a need to deviate from the Electrical Drawings and Specifications, submit written details and reasons for all changes to the Architect for approval.

4. The general arrangement and location of existing conduits, piping, apparatus, etc., is approximate. The drawings and specifications are for the assistance and guidance of the contractor, exact locations, distances and elevations are governed by actual field conditions. Accuracy of data given herein and on the drawings is not guaranteed. Minor changes may be necessary to accommodate work. The contractor is responsible for verifying existing conditions. Should it be necessary to deviate from the design due to interference with existing conditions or work in progress, claims for additional compensation shall be limited to those for work required by unforeseen conditions as determined by the Architect.

5. All drawings and divisions of these specifications shall be considered as whole. The contractor shall report any apparent discrepancies to the Architect prior to submitting bids.

6. The contractor shall be held responsible to have examined the site and compared it with the specifications and plans and to have satisfied himself as to the conditions under which the work is to be performed. He shall be held responsible for knowledge of all existing conditions whether or not accurately described. No subsequent allowance shall be made for any extra expense due to failure to make such examination.

1.06 CLOSEOUT SUBMITTALS:

A. Manuals: Furnish manuals for equipment where manuals are specified in the equipment specifications or are specified in Division 01.

1.07 COORDINATION:

A. Coordinate the electrical work with the other trades, code authorities, utilities and the Architect.

B. Provide and install all trenching, backfilling, conduit, pull boxes, splice boxes, etc. for all Utility Company services to the locations indicated on the Drawings. All materials and construction shall be in accordance with the requirements for all the Utility Companies. Prior to performing any work, the Electrical Contractor shall coordinate with the various Utility Companies and obtain utility company engineering drawings. Verify that all such work and materials shown on the Drawings are of sufficient sizes and correctly located to provide services on the site. The Electrical Contractor shall verify with all the Utility Companies that additional contractor furnished and installed work is not required. If additional work, materials, or changes are required by any of the Utility Companies, the Electrical Contractor shall advise the Architect of such changes and no further work shall then be performed until instructed to do so by the Architect. The Electrical Contractor shall coordinate with the various Utility Companies to schedule inspections and to obtain service connections.

C. The Electrical Contractor shall schedule all utility work necessary for utility inspections, connections, cable installation, etc. for the new electrical service to meet the construction schedule.

D. Utility Company charges shall be paid by the Owner.

E. Contractor shall pay all inspection and other applicable fees and procure all permits necessary for the completion of this work.

F. Where connections must be made to existing installations, properly schedule all the required work, including the power shutdown periods.

G. When two trades join together in an area, make certain that no electrical work is omitted.

1.08 JOB CONDITIONS:

A. Operations: Perform all work in compliance with 01

1. Keep the number and duration of power shutdown periods to a minimum.

2. Show all proposed shutdowns and their expected duration on the construction schedule. Schedule and carry out shutdowns so as to cause the least disruption to operation of the Owner's facilities.

3. Carry out shutdown only after the schedule has been approved, in writing, by the owner. Submit power interruption schedule 15 days prior to date of interruption.

B. Construction Power: Unless otherwise noted in Division 01 of these specifications, contractor shall make all arrangements and provide all necessary facilities for temporary construction power [from the owner's on-site source. Energy costs shall be paid for by the Owner.] [to the site. Energy costs shall be paid by the General Contractor.]

C. Storage: Provide adequate storage for all equipment and materials which will become part of the completed facility so that it is protected from weather, dust, water, or construction operations.

1.09 DAMAGED PRODUCTS:

A. Notify the Architect in writing in the event that any equipment or material is damaged. Obtain approval from the Architect before making repairs to damaged products.

1.10 LOCATIONS:

A. General: Use equipment, materials and wiring methods suitable for the types of locations in which they are located.

B. Dry Locations: All those indoor areas which do not fall within the definition below for Wet Locations and which are not otherwise designated on the Drawings.

C. Wet Locations: All locations exposed to the weather, whether under a roof or not, unless otherwise designated on the Drawings.

1.11 SAFETY AND INDEMNITY:

A. The Contractor is solely and completely responsible for conditions of the job site including safety of all persons and property during performance of the work. This requirement will apply continually and not be limited to normal working hours. The contractor shall provide and maintain throughout the work site proper safeguards including, but not limited to, enclosures, barriers, warning signs, lights, etc. to prevent accidental injury to people or damage to property.

B. No act, service, drawing review or construction review by the Owner, the Engineer or their Consultants is intended to include reviews of the adequacy of the Contractors safety measures in or near the construction site.

C. The Contractor performing work under this Division of the Specifications shall hold harmless, indemnify, and defend the Owner, the Engineer, their consultants, and each of their officers, agents and employees from any and all liability claims, losses, or damage arising out of or alleged to arise from bodily injury, sickness, or death of a person or persons and for all damages arising out of injury to or destruction of property arising directly or indirectly out of or in connection with the performance of the work under this Division of the Specifications, and from the Contractor's negligence in the performance of the work described in the construction contract documents, but not including liability that may be due to the sole negligence of the Owner, the Engineer, their Consultants or their officers, agents and employees.

D. If a work area is encountered that contains hazardous materials, the contractor is advised to coordinate with the owner and its abatement consultant for abatement of hazardous material by the Owner's Representative. "Hazardous materials" means any toxic substance regulated or controlled by OSHA, EPA, State of California or local rules, regulations and laws. Nothing herein shall be construed to create a liability for Aurum Consulting Engineers regarding hazardous materials abatement measures, or discovery of hazardous materials.

1.12 ACCESS DOORS:

A. The contractor shall install access panels as required where floors, walls or ceilings must be penetrated for access to electrical, control, fire alarm or other specified electrical devices. The minimum size panel shall be 14" x 14" in usable opening. Where access by a service person is required, minimum usable opening shall be 18" x 24".

B. All access doors installed lower than 7'-0" above finished floor and exposed to public access shall have keyed locks.

C. Where specific information or details relating to access panels differ from Division 26 paragraph 1.12 of these specifications, or shown on the electrical drawings and details or under other Divisions of work, those requirements shall supersede these specifications.

1.13 ARC FLASH:

A. The contractor shall install a clearly visible arc flash warning to the inside door of all panelboards and industrial control panels, as well as to the front of all switchboards and motor control centers that are a part of this project.

B. The warning shall have the following wording: line 1 "WARNING" (in large letters), line 2 "Potential Arc Flash Hazard" (in medium letters), line 3 & 4 "Appropriate Personal Protective Equipment and Tools required when working on this equipment".

1.14 EMERGENCY BOXES:

A. All boxes and enclosures for emergency circuits shall be permanently marked with a readily visible red spray-painted mark.

PART 2 - PRODUCTS

2.01 STANDARD OF QUALITY:

A. Products that are specified by manufacturer, trade name or catalog number establish a standard of quality and do not prohibit the use of equal products of other manufacturers provided they are established to be equal to the specified product and approved by the Architect prior to installation.

B. Material and Equipment: Provide materials and equipment that are new and are current products of manufacturers regularly engaged in the production of such products. The standard products shall have been in satisfactory commercial or industrial use for two years prior to bid opening. The two-year period includes use of equipment and materials of similar size under similar circumstances. For uniformity, only one manufacturer will be accepted for each type of product.

C. Service Support: Submit a certified list of qualified permanent service organizations including their addresses and qualification for support of the equipment. These service organizations shall be convenient to the equipment installation and able to render service to the equipment on a regular and emergency basis during the warranty period of the contract.

D. Manufacturer's Recommendations: Where installation procedures are required to be in accordance with manufacturer's recommendations, furnish printed copies of the recommendations prior to installation. Installation of the item shall not proceed until recommendations are received. Failure to furnish recommendation shall be cause for rejection of the equipment or material.

2.02 NAMEPLATES:

A. For each piece of electrical equipment, provide a manufacturer's nameplate showing his name, location, the pertinent ratings, the model designation, and shop order number.

B. Identify each piece of equipment and related controls with a rigid laminated engraved plastic nameplate. Unless otherwise noted, nameplates shall be melamine plastic 0.125-inch-thick, white with black center core. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the core. Minimum size of nameplates shall be 0.5 by 2.5 inches unless otherwise noted. Where not otherwise specified, lettering shall be a minimum of 0.25-inch-high normal block style. Engrave nameplates with the inscriptions indicated on the Drawings and, if not so indicated, with the equipment name. Securely fasten nameplates in place using two stainless steel or brass screws.

2.03 FASTENERS:

A. Fasteners for securing equipment to walls, floors and the like shall be either hot-dip galvanized after fabrication or stainless steel.

2.04 FINISH REQUIREMENTS:

A. Equipment: Refer to each electrical equipment section of these Specifications for painting requirements of equipment enclosures. Repair any final paint finish which has been damaged or is otherwise unsatisfactory, to the satisfaction of the Architect.

B. Wiring System: In finished areas, paint all exposed conduits, boxes and fittings to match the color of the surface to which they are affixed.

PART 3 - EXECUTION

3.01 WORKMANSHIP:

A. Ensure that all equipment and materials fit properly in their installation.

B. Perform any required work to correct improperly fit installation at no additional expense to the owner.

C. All electrical equipment and materials shall be installed in a neat and workmanship manner in accordance with the “NECA-1 Standard Practices for Good Workmanship in Electrical Contracting”. Workmanship of the entire job shall be first class in every respect.

3.02 EQUIPMENT INSTALLATIONS:

A. Provide the required inserts, bolts and anchors, and securely attach all equipment and materials to their supports.

B. Do all the cutting and patching necessary for the proper installation of work and repair any damage done.

C. Earthquake restraints: electrical components shall be anchored and installed per the details on the DSA-approved construction documents. The following components shall be anchored or braced to meet the force and displacement requirements prescribed in the 2022 CBC Sections 1617A.1.18 through 1617A.1.26 and ASCE 7-16 Chapters 13, 26, and 30: electrical distribution systems shall be braced to comply with the forces and displacements prescribed in ASCE 7-16 Section 13.3 as defined in ASVE 7-16 Sections 13.6.5, 13.6.6, 13.6.7, 13.6.8, and 2022 CBC, Sections 1617A.1.24, 1617A.1.25 and 1617A.1.26

D. Structural work: All core drilling, bolt anchor insertion, or cutting of existing structural concrete shall be approved by a California registered structural consulting engineer prior to the execution of any construction. At all floor slabs and structural concrete walls to be drilled, cut or bolt anchors inserted, the contractor shall find and mark all reinforcing in both faces located by means of x-ray, pach-ometer, or prof-ometer. Submit sketch showing location of rebar and proposed cuts, cores, or bolt anchor locations for approval.

3.03 FIELD TEST:

A. Test shall be in accordance with Acceptance testing specifications issued by the National Electrical Testing Association (NETA).

B. Perform equipment field tests and adjustments. Properly calibrate, adjust and operationally check all circuits and components, and demonstrate as ready for service. Make additional calibration and adjustments if it is determined later that the initial adjustments are not satisfactory for proper performance. Perform equipment field test for equipment where equipment field tests are specified in the equipment Specifications. Give sufficient notice to the Architect prior to any test so that the tests may be witnessed.

C. Provide instruments, other equipment and material required for the tests. These shall be of the type designed for the type of tests to be performed. Test instrument shall be calibrated by a recognized testing laboratory within three months prior to performing tests.

D. Operational Tests: Operationally test all circuits to demonstrate that the circuits and equipment have been properly installed and adjusted and are ready for full-time service. Demonstrate the proper functioning of circuits in all modes of operation, including alarm conditions.

E. Re-testing will be required for all unsatisfactory tests after the equipment or system has been repaired. Re-test all related equipment and systems if required by the Architect. Repair and re-test equipment and systems which have been satisfactorily tested but later fail, until satisfactory performance is obtained.

F. Maintain records of each test and submit five copies to the Architect when testing is complete. All tests shall be witnessed by the Architect. These records shall include:

1. Name of equipment tested.
2. Date of report.
3. Date of test.
4. Description of test setup.
5. Identification and rating of test equipment.
6. Test results and data.
7. Name of person performing test.
8. Owner or Architect's initials.

G. Items requiring testing shall be as noted in the additional electrical sections of these specifications.

3.04 CLEANING EQUIPMENT:

A. Thoroughly clean all soiled surfaces of installed equipment and materials.

3.05 PAINTING OF EQUIPMENT:

A. Factory Applied: Electrical equipment shall have factory applied painting system which shall, as a minimum, meet the requirements of NEMA ICS 6 corrosion-resistance test and the additional requirements specified in the technical section.

B. Field Applied: Paint electrical equipment as required to match finish of adjacent surfaces.

3.06 RECORDS:

A. Maintain one copy of the contract Drawing Sheets on the site of the work for recording the "as built" condition. After completion of the work, the Contractor shall carefully mark the work as actually constructed, revising, deleting and adding to the Drawing Sheets as required. The following requirements shall be complied with:

1. Cable Size and Type: Provide the size and type of each cable installed on project.

2. Substructure: Where the location of all underground conduits, pull boxes, stub ups and etc. where are found to be different than shown, carefully mark the correct location on the Drawings. Work shall be dimensioned from existing improvements.

3. Size of all conduit runs.

4. Routes of concealed conduit runs and conduit runs below grade.

5. Homerun points of all branch circuit.

6. Location of all switchgear, panels, MCC, lighting control panels, pullcans, etc.

7. Changes made as a result of all approved change orders, addendums, or field authorized revisions.

8. As Builts: At the completion of the Work the Contractor shall review, certify, correct and turn over the marked-up Drawings to the Architect for his use in preparing "as built" plans.

9. As built Drawings shall be delivered to the Architect within ten (10) days of completion of construction.

3.07 CLEAN UP:

A. Upon completion of electrical work, remove all surplus materials, rubbish, and debris that accumulated during the construction work. Leave the entire area neat, clean, and acceptable to the Architect.

3.08 MECHANICAL AND PLUMBING ELECTRICAL WORK:

A. The requirements for electrical power and/or devices for all mechanical and plumbing equipment supplied and/or installed under this Contract shall be coordinated and verified with the following:

1. Mechanical and Plumbing Drawings.
2. Mechanical and Plumbing sections of these Specifications.
3. Manufacturers of the Mechanical and Plumbing equipment supplied.

B. The coordination and verification shall include the voltage, ampacity, phase, location and type of disconnect, control, and connection required. Any changes that are required as a result of this coordination and verification shall be a part of this Contract.

C. The Electrical Contractor shall furnish and install the following for all mechanical and plumbing equipment:

1. Line voltage conduit and wiring.
2. Disconnect switches.
3. Manual line motor starters.

D. Automatic line voltage controls and magnetic starters shall be furnished by the Mechanical and/or Plumbing Contractor and installed and connected by the Electrical Contractor. When subcontracted for by the Mechanical and/or Plumbing Contractor, all line voltage control wiring

installed by the Electrical Contractor shall be done per directions from the Mechanical and/or Plumbing Contractor.

E. All low voltage control wiring for Mechanical and Plumbing equipment shall be installed in conduit. Furnishing, installation and connection of all low voltage conduit, boxes, wiring and controls shall be by the Mechanical and/or Plumbing Contractor.

F. Disconnects (Motor and Circuit)

1. Disconnect switches shall be provided and located at all motors.
2. Switches for three-phase motors shall be heavy-duty, horsepower rated three-pole, and surface mounted except as noted on drawings.
3. Switches containing more than three poles shall be as specified on the drawings.
4. Switches for single-phase, fractional horsepower motors shall be heavy-duty, horsepower rated.
5. Disconnect switches shall be as manufactured by ITE- Siemens, General Electric or Square D.

G. Disconnects (Motor: Fused):

1. Disconnect switches shall be provided and located at all motors.
2. Switches for three-phase motors shall be heavy-duty, horsepower rated three-pole, and surface mounted except as noted on drawings.
3. Switches containing more than three poles shall be as specified on the drawings.
4. Switches for single-phase, fractional horsepower motors shall be heavy-duty, horsepower rated.
5. Disconnect switches shall be as manufactured by ITE- Siemens, General Electric or Square D.

H. Manual motor starters, where required, shall have toggle type operators with pilot light and melting alloy type overload relays, SQUARE D COMPANY, Class 2510, Type FG-1P (surface) or Type FS-1P (flush) or ITE, WESTINGHOUSE or GENERAL ELECTRIC equal.

END OF SECTION 26 05 00

SECTION 26 05 19

LINE VOLTAGE WIRE AND CABLE

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK:

A. The work of this Section consists of providing all wire and cable rated 600 volts or less, including splices and terminations, as shown on the Drawings and as described herein.

1.02 RELATED WORK:

A. See the following Specification Section for work related to the work in this Section:

1. 260542 Conduits, Raceways and Fittings.

2. 260533 Junction and Pull Boxes.

1.03 QUALITY ASSURANCE

A. Field tests shall be performed as specified in paragraph 3.04 of this Section.

PART 2 - PRODUCTS

2.01 CONDUCTORS:

A. Conductors shall be copper, type THHN/THWN/MTW oil and gasoline resistant, 600 volt rated insulation.

B. Conductors shall be stranded copper.

C. Minimum power and control wire size shall be No. 12 AWG unless otherwise noted.

D. All conductors used on this Project shall be of the same type and conductor material.

2.02 CABLES:

A. All individual conductors shall be copper with type THHN/THWN, 600 volt rated insulation.

B. [Non-metallic – sheathed cable (Romex): Type “NM”, 600 volts rated with insulated copper conductors, No. 12 AWG minimum size, and internal copper ground wire.]

C. [Type MC Armored Cable

1. Conductors shall be copper type THHN/THWN/MTW oil and gasoline resistant, 600 volt rated insulation.
2. Conductors shall be stranded copper No.8 AWG and above.
3. Minimum power and control wire shall be No.12 AWG unless otherwise noted.
4. All conductors used on this project shall be of the same type and conductor material.
5. Light weight aluminum interlocked armor.
6. Integral green insulated grounding conductor.]

D. Insulation Marking - All insulated conductors shall be identified with printing colored to contrast with the insulation color.

E. Color Coding - As specified in paragraph 3.03.

F. Special Wiring - Where special wiring is proposed by an equipment manufacturer, submit the special wiring requirements to the Owner's Representative and, if approved, provide same. Special wire shall be the type required by the equipment manufacturer.

G. Other Wiring - Wire or cable not specifically shown on the Drawings or specified, but required, shall be of the type and size required for the application and as approved by the Owner's Representative.

H. Manufacturer - Acceptable manufacturers including Cablec, Southwire, or equal.

2.03 TERMINATIONS:

A. Manufacturer - Terminals as manufactured by T&B, Burndy or equal.

B. Wire Terminations – Stranded conductors shall be terminated in clamping type terminations which serve to contain all the strands of the conductor. Curling of a stranded conductor around a screw type terminal is not allowed. For screw type terminations, use a fork type stake-on termination on the stranded conductor. Use only a stake-on tool approved for the fork terminals selected.

C. End Seals - Heat shrink plastic caps of proper size for the wire on which used.

2.04 TAPE:

A. Tape used for terminations and cable marking shall be compatible with the insulation and jacket of the cable and shall be of plastic material.

PART 3 - EXECUTION

3.01 CABLE INSTALLATION:

A. Clean Raceways - Clean all raceways prior to installation of cables as specified in Section 260542 - Conduits Raceway and Fittings.

B. All line voltage wiring shall be installed in conduit.

C. All feeder conductors shall be continuous from equipment to equipment. Splices in feeders are not permitted unless specifically noted or approved by the Electrical Engineer.

D. All branch circuit wiring shall be run concealed in ceiling spaces, walls, below floors or in crawl spaces unless noted otherwise.

E. Cable Pulling - Exercise care in pulling wires and cables into conduit or wireways so as to avoid kinking, putting undue stress on the cables or otherwise abrading them. No grease will be permitted in pulling cables. Only soapstone, talc, or UL listed pulling compound will be permitted. The raceway construction shall be complete and protected from the weather before cable is pulled into it. Swab conduits before installing cables and exercise care in pulling, to avoid damage to conductors.

F. Bending Radius - Cable bending radius shall be per applicable code. Install feeder cables in one continuous length.

G. Equipment Grounding Conductors - Provide an equipment grounding conductor, whether or not it is shown on the Drawings, in all conduits or all raceways.

H. Panelboard Wiring - In panels, bundle incoming wire and cables which are No. 6 AWG and smaller, lace at intervals not greater than 6 inches, neatly spread into trees and connect to their respective terminals. Allow sufficient slack in cables for alterations in terminal connections. Perform lacing with plastic cable ties or linen lacing twine. Where plastic panel wiring duct is provided for cable runs, lacing is not necessary when the cable is properly installed in the duct.

3.02 CABLE TERMINATIONS AND SPLICES:

A. Splices - UL Listed wirenuts.

B. Terminations - Shall comply with the following:

1. Make up and form cable and orient terminals to minimize cable strain and stress on device being terminated on.

2. Burnish oxide from conductor prior to inserting in oxide breaking compound filled terminal.

3.03 CIRCUIT AND CONDUCTOR IDENTIFICATION:

A. Color Coding - Provide color coding for all circuit conductors. Insulation color shall be white for neutrals and green for grounding conductors. Conductor colors shall be as follows:

VOLTAGE	208/120V	480/277V
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral	White	Grey
Ground	Green	Green

B. Color coding shall be in the conductor insulation for all conductors #10 AWG and smaller; for larger conductors, color shall be either in the insulation or in colored plastic tape applied at every location where the conductor is readily accessible.

C. Circuit Identification - All underground distribution and service circuits shall be provided with plastic identification tags in each secondary box and at each termination. Tags shall identify the source transformer of the circuit and the building number(s) serviced by the circuit.

3.04 FIELD TESTS:

A. All systems shall test free from short circuits and grounds, shall be free from mechanical and electrical defects, and shall show an insulation resistance between phase conductors and ground of not less than the requirements of the CEC. All circuits shall be tested for proper neutral connections.

B. Insulation Resistance Tests: Perform insulation resistance tests on circuits with #2 AWG and larger conductors to be energized with a line-to-neutral voltage of 120 volts or more. Make these tests before all equipment has been connected. Test the insulation with a 500Vdc insulation resistance tester with a scale reading 100 megohms. The insulation resistance shall be 2 megohms or more. Submit results for review.

END OF SECTION 26 05 19

SECTION 26 05 26

GROUNDING

PART 1 GENERAL

1.1 SECTION INCLUDES:

A. Conduits, wires, ground rods and other materials for the electrical grounding system.

1.2 RELATED SECTIONS:

A. Section 260500- Electrical General Requirements.

PART 2 PRODUCTS

2.1 GROUND ROD:

A. "Copperweld" ground rod conforming to or exceeding requirements of U.L. Specification No. 467 (ANSI C-33.8). Rod shall be 3/4" diameter and 10' in length, unless otherwise noted on the Drawings.

2.2 BELOW GRADE CONNECTIONS:

A. Compression fittings, Thomas & Betts, Series 52000, 53000 or 54000 or approved equal.

2.3 HARDWARE:

A. Bolts, nuts and washers shall be bronze, cadmium plated steel or other non-corrosive materials, approved for the purpose.

2.4 WATERPROOF SEALANT:

A. Use Kearney "Aqua Seal" mastic sealant on all below grade clamp or compression type connections.

PART 3 EXECUTION

3.1 GroUNDING AND BONDING:

A. Grounding and bonding shall be as required by codes and local authorities.

B. All electrical equipment shall be grounded, including, but not limited to, panel boards, terminal cabinets and outlet boxes.

C. The ground pole of receptacles shall be connected to their outlet boxes by means of a copper ground wire connecting to a screw in the back of the box.

D. A green insulated copper ground wire, sized to comply with codes, shall be installed in all conduit runs.

E. All metal parts of pull boxes shall be grounded per code requirements.

F. All ground conductors shall be green insulated copper.

G. The ground system electrodes shall be tested for resistance before the equipment ground conductors are connected. Maximum ground system resistance shall be 25 ohms. Install up to two additional ground rods to meet the 25-ohm requirement. Multiple ground rods shall not be less than 10 feet apart.

H. Grounding of the panels [,] [and] buildings [and relocatables]. shall be completed as indicated on the Drawings.

END OF SECTION 26 05 26

SECTION 26 05 33

OUTLET, JUNCTION AND PULL BOXES

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK:

A. The work of this Section consists of providing all required labor, supervision, materials and equipment to satisfactorily complete all electrical installations shown on the drawings, included in these Specification, or otherwise needed for a complete and fully operating facility. The work shall include but not be limited to the following:
B. Furnish and install all required material, supports and miscellaneous material for the satisfactory interconnection of all associated electrical systems.

1.02 RELATED WORK:

A. See the following specification sections for work related to the work of this section.

1. 260500 General Electrical Requirements.

2. 260542 Conduits, Raceway and Fittings.

3. 260519 Line Voltage Wire and Cable.

PART 2 - PRODUCTS

2.01 OUTLET BOXES, JUNCTION AND PULL BOXES

A. Standard Outlet Boxes: Galvanized, steel, knock-out type of size and configuration best suited to the application indicated on the Drawings. Minimum box size shall be 4 inches square (octagon for most light fixtures) by 1-1/2 inches deep with mud rings as required.

B. Switch boxes: Minimum box size shall be 4 inches square by 1-1/2 inches deep with mud rings as required. Install multiple switches in standard gang boxes with raised device covers suitable for the application indicated.

C. Conduit bodies: Cadmium plated, cast iron alloy. Conduit bodies with threaded conduit hubs and neoprene gasketed, cast iron covers. Bodies shall be used to facilitate pulling of conductors or to make changes in conduit direction only. Splices are not permitted in conduit bodies. Crouse-Hinds Form 8 Condulets, Appleton Form 35 Unilets or equal.

D. Sheet Metal Boxes: Use standard outlet or concrete ring boxes wherever possible; otherwise use a minimum 16-gauge galvanized sheet metal, NEMA I box sized to Code requirements with covers secured by cadmium plated machine screws located six inches on centers. Circle AW Products, Hoffman Engineering Company or equal.

E. Flush Mounted Pull boxes and Junction boxes: Provide overlapping covers with flush head cover retaining screws, prime coated.

PART 3 - EXECUTION

3.01 OUTLET BOXES

A. General:

1. All outlet boxes shall finish flush with building walls, ceilings and floors except in mechanical and electrical rooms above accessible ceiling or where exposed work is called for on the Drawings.

2. Install raised device covers (plaster rings) on all switch and receptacle outlet boxes installed in masonry or stud walls or in furred, suspended or exposed concrete ceilings. Covers shall be of a depth to suit the wall or ceiling finish.

3. Leave no unused openings in any box. Install close-up plugs as required to seal openings.

B. Box Layout:

1. Outlet boxes shall be installed at the locations and elevations shown on the drawings or specified herein. Make adjustments to locations as required by structural conditions and to suit coordination requirements of other trades.

2. Locate switch outlet boxes on the latch side of doorways.

3. Outlet boxes shall not be installed back to back nor shall through-wall boxes be permitted. Outlet boxes on opposite sides of a common wall shall be separated horizontally by at least one stud or vertical structural member.

4. For outlets mounted above counters, benches or backsplashes, coordinate location and mounting heights with built-in units. Adjust mounting height to agree with required location for equipment served.

5. On fire rated walls, the total face area of the outlet boxes shall not exceed 100 square inches per 100 square feet of wall area.

C. Supports:

1. Outlet Boxes installed in metal stud walls shall be equipped with brackets designed for attaching directly to the studs or shall be mounted on specified box supports.

2. Fixture outlet boxes installed in suspended ceiling of gypsum board or lath and plaster construction shall be mounted to 16-gauge metal channel bars attached to main ceiling runners.

3. Fixture outlet boxes installed in suspended ceilings supporting acoustical tiles or panels shall be supported directly from the structure above where pendant mounted lighting fixture are to be installed on the box.

4. Fixture Boxes above tile ceilings having exposed suspension systems shall be supported directly from the structure above.

5. Outlet and / or junction boxes shall not be supported by grid or fixture hanger wires at any locations.

3.02 JUNCTION AND PULL BOXES

A. General:

1. Install junction or pull boxes where required to limit bends in conduit runs to not more than 360 degrees or where pulling tension achieved would exceed the maximum allowable for the cable to be installed. Note that these boxes are not shown on the Drawings.

2. Locate pull boxes and junction boxes in concealed locations above accessible ceilings or exposed in electrical rooms, utility rooms or storage areas.

3. Install raised covers (plaster rings) on boxes in stud walls or in furred, suspended or exposed concrete ceilings. Covers shall be of a depth to suit the wall or ceiling finish.

4. Leave no unused openings in any box. Install close-up plugs as required to seal openings.

5. Identify circuit numbers and panel on cover of junction box with black marker pen.

B. Box Layouts:

1. Boxes above hung ceilings having concealed suspension systems shall be located adjacent to openings for removable recessed lighting fixtures.

C. Supports:

1. Boxes installed in metal stud walls shall be equipped with brackets designed for attaching directly to the studs or shall be mounted on specified box supports.

2. Boxes installed in suspended ceilings of gypsum board or lath and plaster construction shall be mounted to 16-gauge metal channel bars attached to main ceiling runners.

3. Boxes installed in suspended ceilings supporting acoustical tiles or panels shall be supported directly from the structure above.

4. Boxes mounted above suspended acoustical tile ceilings having exposed suspension systems shall be supported directly from the structure above.

END OF SECTION 26 05 33

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SECTION 26 05 42

CONDUITS, RACEWAYS AND FITTINGS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK:

A. The work of this section consists of furnishing and installing conduits, raceways and fittings as shown on the Drawings and as described herein.

1.02 RELATED WORK:

A. See the following specification sections for work related to the work in this section:

1. 260543 Underground Ducts
2. 260544 In Grade Pull Boxes
3. 260519 Line Voltage Wire and Cable
4. 260533 Junction and Pull Boxes

PART 2 - PRODUCTS

2.01 CONDUITS, RACEWAYS:

A. Electrical Metallic Tubing (EMT) shall be hot-dip galvanized after fabrication. Couplings shall be compression or set-screw type.

B. Flexible Conduit: Flexible metal conduit shall be galvanized steel.

C. Galvanized Rigid Steel Conduit (GRS) shall be hot-dip galvanized after fabrication. Couplings shall be threaded type.

D. Rigid Non-metallic Conduit: Rigid non-metallic conduit shall be PVC Schedule 40 (PVC-40 or NEMA Type EPC-40) conduit approved for underground use and for use with 90˚ C wires.

2.02 CONDUIT SUPPORTS:

A. Supports for individual conduits shall be galvanized malleable iron one-hole type with conduit back spacer.

B. Supports for multiple conduits shall be hot-dipped galvanized Unistrut or Superstrut channels, or approved equal. All associated hardware shall be hot-dip galvanized.

C. Supports for EMT conduits shall be galvanized pressed steel single hole straps.

D. Clamp fasteners shall be by wedge anchors. Shot in anchors shall not be allowed.

2.03 FITTINGS:

A. Provide threaded-type couplings and connectors for rigid steel conduits; provide steel compression (watertight), or steel set-screw type for EMT, (die-cast zinc or malleable iron type

fittings are not allowed). Provide threaded couplings and Meyers hubs for rigid steel conduit exposed to weather.

B. Fittings for flexible conduit shall be Appleton, Chicago, IL, Type ST, O-Z Gedney Series 4Q by General Signal Corp., Terryville, CT, T & B 5300 series, or approved equal.

C. Fittings for use with rigid steel shall be galvanized steel or galvanized cast ferrous metal; access fittings shall have gasketed cast covers and be Crouse Hinds Condulets, Syracuse, NY, Appleton Unilets, Chicago, IL, or approved equal. Provide threaded-type couplings and connectors; set-screw type and compression-type are not acceptable.

D. Fittings for use with rigid non-metallic conduit shall be PVC and have solvent-weld-type conduit connections.

E. Union couplings for conduits shall be the Erickson type and shall be Appleton, Chicago, IL, Type EC, O-Z Gedney 3-piece Series 4 by General Signal Corp., Terryvile, CT, or approved equal. Threadless coupling shall not be used.

F. Bushings:

1. Bushings shall be the insulated type.

2. Bushings for rigid steel shall be insulated grounding type, O-Z Gedney Type HBLG, Appleton Type GIB, or approved equal.

G. Conduit Sealants:

1. Fire Retardant Types: Fire stop material shall be reusable, non-toxic, asbestos-free, expanding, putty type material with a 3-hour rating in accordance with UL Classification 35L4 or as specified on the Drawings.

PART 3 - EXECUTION

3.01 CONDUIT, RACEWAY AND FITTING INSTALLATION:

A. For conduit runs exposed to weather provide rigid metal (GRS).

B. For conduit run underground, in concrete or masonry block wall and under concrete slabs, install minimum ¾" size nonmetallic (PVC) with PVC elbows. Where conduits transition from underground or under slab to above grade install wrapped rigid metal (GRS) elbows and risers.

C. For conduit runs concealed in steel or wood framed walls or in ceiling spaces or exposed in interior spaces above six feet over the finished floor, install EMT.

D. Flexible metal conduit shall be used only for the connection of recessed lighting fixtures and motor connections unless otherwise noted on the Drawings. Liquid-tight steel flexible conduit shall be used for motor connections.

E. The minimum size raceway shall be 1/2-inch unless indicated otherwise on the Drawings.

F. Installation shall comply with the CEC.

G. From pull point to pull point, the sum of the angles of all of the bends and offset shall not exceed 360 degrees.

H. Conduit Supports: Properly support all conduits as required by the NEC. Run all conduits concealed except where otherwise shown on the drawings.

1. Exposed Conduits: Support exposed conduits within three feet of any equipment or device and at intervals not exceeding NEC requirements; wherever possible, group conduits together and support on common supports. Support exposed conduits fastened to the surface of the concrete structure by one-hole clamps, or with channels. Use conduit spacers with one-hole clamps.

a. Conduits attached to walls or columns shall be as unobtrusive as possible and shall avoid windows. Run all exposed conduits parallel or at right angles to building lines.

b. Group exposed conduits together. Arrange such conduits uniformly and neatly.

2. Support all conduits within three feet of any junction box, coupling, bend or fixture.

3. Support conduit risers in shafts with Unistrut Superstrut, or approved equal, channels and straps.

I. Moisture Seals: Provide in accordance with NEC paragraphs 230-8 and 300-5(g).

J. Where PVC conduit transitions from underground to above grade, provide rigid steel 90's with risers. Rigid steel shall be half-lap wrapped with 20 mil tape and extend minimum 12" above grade.

K. Provide a nylon pull cord in each empty raceway.

L. Provide galvanized rigid steel factory fittings for galvanized rigid steel conduit.

M. Slope all underground raceways to provide drainage; for example, slope conduit from equipment located inside a building to the pull box or manhole located outside the building.

N. Conduits shall be blown out and swabbed prior to pulling wires, or installation of pull cord in empty conduits.

END OF SECTION 26 05 42

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SECTION 26 05 44

IN GRADE PULL BOXES

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK:

A. The work of this section consists of providing all labor, supervision, tools, materials, and performing all work necessary to furnish and install pre-cast concrete vaults, and pull boxes with necessary excavation.

1.02 RELATED WORK:

A. See the following specification sections for work related to the work of this section.

1. 02200 Excavation and Backfill.

2. 260543 Underground Ducts.

1.03 SUBMITTALS:

A. As specified in Section 260500 and Division 01.

1. Catalog Data: Provide manufacturer's descriptive literature - Pre-cast Vaults, Pull Boxes and Accessories.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT:

A. General Requirements:

1. Pull boxes for electrical power, controls and other communication circuits shall consist of pre-cast reinforced concrete boxes, extensions' bases, and covers as specified herein and as indicated on the Drawings. Pre-cast units shall be the product of a manufacturer regularly engaged in the manufacture of pre-cast vaults and pull boxes. Acceptable manufacturers are Christy, Utility Vault, Brooks, Associated Concrete or equal.

B. Construction:

1. Pre-cast concrete vaults and pull boxes for electrical power distribution and communication circuits with associated risers and tops shall conform to ASTM C478 and ACI 318. Pull boxes shall be the type noted on the Drawings and shall be constructed in accordance with the applicable details as shown. Tops and walls shall consist of reinforced concrete. Walls and bottom shall be of monolithic concrete construction. Duct entrances and windows shall be located near the corners of structures to facilitate cable racking.

C. Covers:

1. The word "ELECTRICAL" shall be cast in the top face of all electrical cable boxes. The word “Signal” or “Fire Alarm” shall be cast in the top of the boxes utilized for these systems.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Install pull boxes where required to limit bends in conduit runs to not more than 360 degrees or where pulling tension achieved would exceed the maximum allowable for the cable to be installed. Note that these boxes are not shown on the Drawings.

B. Pre-cast pull boxes shall be installed approximately where indicated on the Drawings. The exact location of each pull box shall be determined after careful consideration has been given to the location of other utilities, grading, and paving. All cable boxes and secondary pull boxes shall be installed with a minimum of 6-inch thick crushed rock or sand bedding.

C. Paved areas - Vaults and pull boxes located in areas to be paved shall be installed such that the top of the cover shall be flush with the finished surface of the paving.

D. Unpaved Areas - In unpaved areas, the top of vaults and pull box covers shall be approximately 2 inches above finished grade.

E. Joint Seals - Section joints of pre-cast vaults and pull boxes shall be sealed with compound as recommended by the manufacturer.

F. Trenching, Backfilling, and Compaction - Trenching, backfilling and compaction shall be as specified in Section 02200 - Excavation and Backfill.

END OF SECTION 26 05 44

SECTION 26 05 73

ELECTRICAL POWER SYSTEM STUDIES

PART 1 - GENERAL

A. The electrical equipment manufacturer shall provide electrical power system studies for the project. The type and content of each study is specified in the following articles.

A. Completed electrical power system studies shall be bound and submitted to the architect prior to or as a part of the switchboard and panelboard submittals.

PART 2 - PRODUCTS

A. The specified electrical power system studies shall be performed by Square D Company or approved equal.

A. Protective Device Time-Current Coordination Analysis

1. The time-current coordination analysis shall be performed with the aid of computer software intended for this purpose, and will include the determination of settings, ratings, or types for the overcurrent protective devices supplied.

2. Where necessary, an appropriate compromise shall be made between system protection and service continuity with [service continuity considered more important than system protection] [system protection considered more important than service continuity] [system protection and service continuity considered to be of equal importance].

3. A sufficient number of computer-generated log-log plots shall be provided to indicate the degree of system protection and coordination by displaying the time-current characteristics of series connected overcurrent devices and other pertinent system parameters.

4. Computer printouts shall accompany the log-log plots and will contain descriptions for each of the devices shown, settings of the adjustable devices, the short-circuit current availability at the device location when known, and device identification numbers to aid in locating the devices on the log-log plots and the system one-line diagram.

5. The study shall include a separate, tabular computer printout containing the suggested device settings of all adjustable overcurrent protective devices, the equipment where the device is located, and the device number corresponding to the device on the system one-line diagram.

6. A computer-generated system one-line diagram shall be provided which clearly identifies individual equipment buses, bus numbers, device identification numbers and the maximum available short-circuit current at each bus when known.

7. A discussion section which evaluates the degree of system protection and service continuity with overcurrent devices, along with recommendations as required for addressing system protection or device coordination deficiencies.

8. Significant deficiencies in protection and/or coordination shall be called to the attention of the architect and recommendations made for improvements as soon as they are identified.

9. The contractor shall be responsible for supplying pertinent electrical system conductor, circuit breaker, generator, and other component and system information in a timely manner to allow the time-current analysis to be completed prior to final installation.

B. Short-Circuit Analysis

1. Calculation of the maximum rms symmetrical three-phase short-circuit current at each significant location in the electrical system shall be made using a digital computer.

2. Appropriate motor short-circuit contribution shall be included at the appropriate locations in the system so that the computer calculated values represent the highest short-circuit current the equipment will be subjected to under fault conditions.

3. A tabular computer printout shall be included which lists the calculated short-circuit currents, X/R ratios, equipment short-circuit interrupting or withstand current ratings, and notes regarding the adequacy or inadequacy of the equipment.

4. The study shall include a computer printout of input circuit data including conductor lengths, number of conductors per phase, conductor impedance values, insulation types, transformer impedances and X/R ratios, motor contributions, and other circuit information as related to the short-circuit calculations.

5. Include a computer printout identifying the maximum available short-circuit current in rms symmetrical amperes and the X/R ratio of the fault current for each bus/branch calculation.

6. The system one-line diagram shall be computer generated and will clearly identify individual equipment buses, bus numbers used in the short-circuit analysis, cable and bus connections between the equipment, calculated maximum short-circuit current at each bus location and other information pertinent to the computer analysis.

7. A comprehensive discussion section evaluating the adequacy or inadequacy of the equipment must be provided and include recommendations as appropriate for improvements to the system.

8. The contractor shall be responsible for supplying pertinent electrical system conductor, circuit breaker, generator, and other component and system information in a timely manner to allow the short-circuit analysis to be completed prior to final installation.

9. Any inadequacies shall be called to the attention of the architect and recommendations made for improvements as soon as they are identified.

C. Arc-Flash Hazard Analysis

1. The Arc-Flash Hazard Analysis shall be performed with the aid of computer software intended for this purpose in order to calculate Arc-Flash Incident Energy (AFIE) levels and flash protection boundary distances.

2. The Arc-Flash Hazard Analysis shall be performed in conjunction with a short-circuit analysis and a time-current coordination analysis.

3. Results of the Analysis shall be submitted in tabular form, and shall include device or bus name, bolted fault and arcing fault current levels, flash protection boundary distances, personal-protective equipment classes and AFIE levels.

4. The analysis shall be performed under worst-case Arc-Flash conditions, and the final report shall describe, when applicable, how these conditions differ from worst-case bolted fault conditions.

5. The Arc-Flash Hazard Analysis shall be performed by a registered professional engineer.

6. The Arc-Flash Hazard Analysis shall be performed in compliance with IEEE Standard 1584-2002, the IEEE Guide for Performing Arc-Flash Calculations.

7. The Arc-Flash Hazard Analysis shall include recommendations for reducing AFIE levels and enhancing worker safety.

8. The proposed vendor shall demonstrate experience with Arc-Flash Hazard Analysis by submitting names of at least ten actual Arc-Flash Hazard Analyses it has performed in the past year.

9. The proposed vendor shall demonstrate capabilities in providing equipment, services, and training to reduce Arc-Flash exposure and train workers in accordance with NFPA 70E and other applicable standards.

10. The proposed vendor shall demonstrate experience in providing equipment labels in compliance with NEC-2002 section 110 and ANSI Z535.4 to identify AFIE and appropriate Personal Protective Equipment classes.

[D Load Flow and Voltage Drop Analysis

1. The Load Flow and Voltage Drop Analysis shall be made using a digital computer and include calculations of power flow in all three-phase branch and feeder circuits, calculated voltages at each bus and voltage drops of each feeder.

2. The analysis shall provide the calculated maximum values of kva, kW, kvar, power factor, and amperes for each power circuit.

3. The calculated power losses in each branch and total system losses shall be provided.

4. A computer printout listing all cables, transformers, loads, and other circuit data shall be included.

5. Provide tabular bus-to-bus computer printouts listing the calculated values.

6. The analysis shall include a computer-generated system one-line diagram clearly identifying individual equipment buses, bus numbers, cable and bus connections, power flow throughout the system, and other information related to the analysis.

7. A discussion section evaluating the loading and voltage levels for the system shall be provided and recommendations included as appropriate to improve system operation.

8. Significant deficiencies in loading or voltage levels shall be called to attention of the architect and recommendations made for improvements at soon as they are identified.]

[E. Power Factor Correction Study

1. A Power Factor Correction Study shall be performed to determine the appropriate level of compensation needed to achieve the desired power factor.

2. Impacts on harmonic and transient concerns shall be evaluated in order to determine the optimum size and configuration of the equipment.

3. The study shall make appropriate recommendations in order to provide proper operation of the electrical system.

4. The study shall be based on [load data collected from on-site measurements] [load data collected from historical information provided by the power monitoring system] [from previous utility bills] in order to characterize the power factor of the system over a period of time and under varying load conditions.

5. System loading tables shall be provided which include power factor data and estimated levels of power factor compensation provided.

6. Evaluation of system operation using the estimated levels of compensation will be provided with consideration to harmonic and transient concerns.

7. Final levels of compensation will be determined and used as the base case condition for the harmonic and transient studies.

8. All conclusions, recommendations, and equipment specifications as a result of the Power Factor Correction Study will be summarized in the final report.]

[F. Harmonic Analysis Study

1. A Harmonic Analysis Study shall be made to determine the levels of harmonic voltages and currents in the system.

2. The type and level of compensation needed to achieve the desired power factor and acceptable levels of harmonics shall be considered.

3. Transient concerns shall be evaluated in order to determine the optimum equipment size, location in the system, and configuration.

4. The study shall make appropriate recommendations in order to provide proper protection and operation of the electrical system.

5. The study will shall be based on [load data collected from on-site measurements] [load data collected from historical information provided by the power monitoring system] [from previous utility bills] in order to characterize the power factor of the system over a period of time and under varying load conditions.

6. Harmonic measurements will be performed in order to provide nonlinear load (e.g. DC drive) characteristics, voltage distortion levels, and model verification. The measurements will be conducted over a 1-5-day period.

7. Harmonic source models will be developed for each nonlinear load (drive, etc.) type. The load characteristics [will be determined by measurement and used as harmonic sources for

the computer simulations.] [shall be approximated based on the loads indicated on the project drawings.]

8. Frequency scan cases (impedance vs frequency) will be completed in order to determine the system frequency response characteristic for various system conditions.

9. If required, the application of harmonic filters will be evaluated to determine the optimum filter size and configurations.

10. Computer simulations shall be performed to determine the system harmonic voltage and current levels and voltage distortion levels (and compared with measured values to determine the effect of various system conditions).

11. If required, harmonic filter specifications shall be developed with consideration to cost, filtering options, and effectiveness of harmonic filters.]

[G. Switching Transient Analysis Study

1. A Switching Transient Analysis Study shall be made to determine the transient over voltages for various switching conditions and their effect on the operation of the electrical system.

2. Various system conditions (consistent with previously gathered data from the Power Factor Correction Study and Harmonic Analysis Study) shall be evaluated so that the proper overvoltage protection specifications may be developed.

3. Transient simulations shall be performed using a digital computer in order to determine transient voltage levels at the low voltage buses within the electrical system.

4. The electrical system parameters shall be varied to in order to determine their effect on the transient voltages.

5. Various solutions to excessive transient voltage levels shall be considered and additional computer simulations made to determine their validity.

6. The evaluation must consider solutions to power factor and harmonic concerns with respect to transient overvoltage levels.

7. Nuisance tripping of electronic power equipment (e.g., adjustable speed drives) shall be evaluated and corrective or preventive techniques suggested.]

END OF SECTION 26 05 73

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SECTION 26 09 43.13

DIGITAL-NETWORK LIGHTING CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. System Software Interfaces.
2. System Backbone and Integration Equipment.
3. Wired Networked Devices.
4. Wireless Networked Devices.

B. Related Requirements:

1. Div. 26: Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.
3. Section 262726 "Wiring Devices" for wired switches and dimmers and other Project requirements applicable to Work specified in this Section.

1.2 DEFINITIONS

A. Data Bus: A wired interface used to communicate with connected devices.

B. Device: A collective term for bus or wireless connected devices, including fluorescent ballasts, LED drivers, incandescent luminaires, manual switches, switching relays, sensors, and similar.

C. Global: Communication between devices in otherwise separate spaces using a bridging device or system controller.

D. Group: A set of devices that communicate together.

E. Monitoring: Acquisition, processing, communication, and display of equipment status data, metered electrical parameter values, power quality evaluation data, event and alarm signals, tabulated reports, and event logs.

F. Scene: Digital light level associated with a preset.

G. System Backbone: Devices used to connect and manage otherwise separate spaces, including bridging devices and gateways or system controllers. Used to expose devices to software configuration via TCP/IP.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Enter Project Location.

B. Preinstallation Coordination Meeting(s): For digital-network lighting controls. Conduct meeting(s) Enter Meeting Venue before Insert construction activity.

1. Attendees: Installers, fabricators, representatives of manufacturers, and administrants for field tests and inspections. Notify Architect and <enter other required attendees> of scheduled meeting dates.
2. Engage factory-authorized service representative to attend preinstallation conference and review the submittal drawing, sequence of operation, and device installation best practices with Project team.
3. Engage factory-authorized service representative to perform cellular signal strength measurements during site walk through and compare to Project plans to verify the placement of cellular antennas and quantity of lighting control system RF access points.

1.4 ACTION SUBMITTALS

A. Product Data:

1. Bill of Materials necessary to install the networked lighting control system.
2. Product Specification Sheets indicating general device descriptions, dimensions, electrical specifications, wiring details, and nomenclature.
3. Information Technology (IT) connection information pertaining to interconnection with facility IT networking equipment and third-party systems.
4. Other Diagrams and Operational Descriptions - as needed to indicate system operation or interaction with other system(s).

B. Shop Drawings:

1. Riser Diagrams showing device wiring connections of system backbone and typical per room/area type.

1.5 INFORMATIONAL SUBMITTALS

A. Contractor Startup/Commissioning Worksheet.

B. Service Specification Sheets indicating general service descriptions, including startup, training, post-startup support, and service contract terms.

C. Field quality-control reports.

D. Sample Warranty: For manufacturer's special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Contracts:

1. Hardware and Software Operation Manuals
2. Maintenance service agreement.
3. Software service agreement.

B. Warranty documentation.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Phone Support: Toll-free technical support available from manufacturer through an online tool to schedule a technical support appointment and provide 24/7 emergency support.
2. Remote Support: Manufacturer capable of providing remote support and ability to virtually connect with customers to address issues with visual guidance overlaid on images of real-world objects.
3. Cellular Connectivity: Manufacturer capable of cellular connectivity to a networked lighting control system available to provide remote support within the continental United States.
4. On-Site Support: Manufacturer capable of providing a 72-hour, on-site response time within the continental United States.
5. Service Contracts: Manufacturer capable of providing service contracts for continued on-site and remote support of the lighting control system post-installation for terms up to 10 years from substantial completion, including:

    a. Remote and on-site emergency response.
    b. Remote system performance checks.
    c. Remote diagnostics.
    d. Replacement parts.

1.8 WARRANTY

A. Warranty: Manufacturer and Installer warrant that installed lighting control devices perform in accordance with specified requirements and agree to repair or replace, including labor, materials, and equipment, devices that fail to perform as specified within extended warranty period.

1. Failures include, but are not limited to, the following:

    a. Faulty operation of lighting control hardware.
    b. Faulty operation of lighting control firmware.
    c. Insert failure modes.

2. Minimum Warranty Period: Five years from date of shipment.
3. Extended Warranty Period: Insert number year(s) from date of shipment.

PART 2 - PRODUCTS

2.1 SYSTEM COMPLIANCE

A. System components manufactured in accordance with UL 916 and UL 924 standards where applicable.

B. System components manufactured in accordance with CFR Title 47, Part 15 standards where applicable.

C. System components manufactured in accordance with ISED Canada RSS-247 standards where applicable.

D. System components manufactured in accordance with IFT-008-2015 and NOM-208-SCFI-2016 standards where applicable.

E. System listed as qualified under DesignLights Consortium Networked Lighting Control System Specification v5.0.

F. Performance Criteria:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

2.2 SYSTEM PERFORMANCE REQUIREMENTS

A. System Architecture:

1. System architecture based upon the following concepts:

a. Networkable intelligent lighting control devices.
b. Standalone lighting control zones using distributed intelligence.
c. Optional system backbone for remote, time-based, and global operation.

2. Intelligent lighting control devices with individually addressable network communication capability and having one or more basic lighting control components including: occupancy sensor, photosensor, relay, dimming output, contact closure input, analog 0-10 V(dc) input, and manual wall station capable of indicating switching, dimming, and/or scene control. Combining one or more of these components into a single device enclosure permissible to minimize overall system device count.
3. System capable of interfacing directly with networked luminaires such that either low-voltage network cabling or wireless RF communication is used to interconnect networked luminaires with control components such as sensors, switches, and system backbone.
4. Networked luminaires and intelligent lighting control devices support individual (unique) configuration of device settings and properties, with such configuration residing within the networked luminaires and intelligent control devices.
5. Lighting control zones consisting of one or more networked luminaires and intelligent lighting control devices capable of providing automatic control from sensors (occupancy and/or photosensor) and manual control from local wall stations without requiring connection to a higher-level system backbone.

a. Lighting control zones (wired and wireless) support at least 128 devices per zone.
b. Capable of being networked with a higher-level system backbone to provide time-based control, control from inputs or systems external to control zone, and remote configuration and monitoring through a software interface.

6. Networked luminaires and intelligent lighting control devices with distributed intelligence programming stored in non-volatile memory, such that following any loss of power the lighting control zones operate according to their defined default settings and sequence of operations.
7. System to include one or more system controllers that provide time-based control.

8. System controller provides means of connecting the lighting control system to a system software interface and building management systems via BACnet/IP or BACnet MS/TP protocol.
9. System controller supports both low-voltage wired and wireless RF communication within a single controller device.
10. System devices support firmware update, either remotely or from within the application space, for purposes of upgrading functionality at a later date.
11. System capable of reporting lighting system events and performance data to management software for display and analysis.

B. Wired Networked Control Zone Characteristics:

1. Connections to devices within a wired networked lighting control zone and to backbone components accomplished with a single type of low-voltage network cable, compliant with CAT5e specifications or higher. Use of mixed types of low-voltage network cables is unacceptable.
2. Devices connected in "daisy-chain" topology. "Hub-and-spoke" topology, requiring all individual networked devices to be connected to a central component, is unacceptable, to reduce the total amount of network cable required for each control zone.
3. Pre-terminated, plenum-rated, low-voltage network cabling supplied with hardware.
4. Following proper installation and provision of power, all networked devices connected with low-voltage network cable must automatically form a functional lighting control zone without requiring any type of programming, regardless of the programming mechanism (e.g. software application, handheld remote, pushbutton).

    a. The "out of box" default sequence of operation is intended to provide typical sequence of operation to minimize the system startup and programming requirements and to also have functional lighting control operation prior to system startup and programming.

5. System software capable of automatic discovery of all connected devices without requiring any provisioning of system or zone addresses.
6. Networked devices capable of detecting improper communication wiring and LED notification to alert installation/startup personnel.
7. Networked control devices suitable for control of egress or emergency light sources without additional, externally mounted UL 924 shunting or 0-10 V(dc) disconnect devices, to provide a compliant sequence of operation while reducing the overall installation and wiring costs of the system. Capable of supporting the following sequence of operation:

    a. Low-Voltage Power Sensing: Devices automatically provide 100 percent light level upon detection of loss of power sensed via low-voltage network cable connection where applicable.
    b. Line-Voltage Power Sensing: Devices listed as UL 924 emergency relays which automatically close load-control relay and provide 100 percent light output upon detection of loss of power sensed via line voltage connection to normal power.

8. Global Control Zones: Networked luminaires and intelligent lighting control devices located in different areas able to transmit and track information within at least 128 system-wide control zones to support required sequences of operation that may span multiple areas. Occupancy, photosensor inhibit, and switch commands available across multiple controllers.
9. Wired Networked Wall Station Scene-Control Capabilities:

    a. Preset Scenes that activate a specific combination of light levels across multiple local and global channels.

b. Local Profile Support: Profile Scenes that modify the sequence of operation for devices in the area (group) in response to a button press to dynamically optimize occupant experience and lighting energy usage.

1) Wall stations able to manually start and stop local profiles, or local profile capable of ending after a specific duration of time between five minutes and 12 hours.
2) Configurable Parameters:

a) Fixture light level.
b) Occupancy time delay.
c) Response to occupancy sensors (including enabling/disabling response).
d) Response to daylight sensors (including enabling/disabling response).
e) Enabling/disabling wall stations.

c. Three-Way or Multi-Way Control: Multiple wall stations capable of controlling the same local and global control zones, to support "multi-way" preset scene and profile scene control.

C. Wireless Networked Control Zone Characteristics:

1. No wired connections between networked devices required for the purposes of system communications.
2. Multiple wireless networking protocols supported:

a. Standards-based, distributed star topology type of protocol for 900 MHz communication, to support lighting control applications and IoT applications.
b. Bluetooth standard protocol for 2.4 GHz communication that supports direct connection to smartphone or tablet, to support device configuration, control applications, and IoT without requiring the use of a system backbone.

3. Wireless network must be self-healing, such that the loss of backbone or local communication between devices does not result in the loss of local control of lights in the space.
4. Wireless network communication must support uniform and instant response such that all luminaires in a lighting control zone respond immediately and synchronously in response to a sensor or wall station signal.
5. Communication of control signals from sensors and wall stations to networked luminaires and wireless load-control devices occur directly, without any communication, interpretation, or translation of information through a backbone device such as a wireless access point, communication bridge, or gateway.
6. All wireless communication between lighting control components supports the following five tiers of security measures.

a. Data encryption.
b. Firmware protection.
c. Tamper-proof hardware.
d. Authenticated user access.
e. Mutual device authentication.

7. Wireless devices use AES encryption to secure communication with a unique encryption key generated for each programmed site.
8. Wireless devices use signed firmware to ensure that unmodified, authentic software is always installed.

9. Wireless networked devices capable of communicating a minimum distance of 150 ft. (45 m) between devices under typical site conditions accounting for typical environmental conditions and building construction materials encountered within commercial indoor lighting environments.
10. Minimum Line-of-Sight Communication Range: 1000 ft. (304 m) under ideal environmental conditions.
11. Wireless devices self-identify when communication to system controller cannot be accomplished or when communication to the system controller is lost.

    a. Self-identification not required for wireless switches or battery-powered devices.

12. Wireless devices self-establish connection to system controller through other devices if direct communication cannot be accomplished or when communication to system controller is lost.

    a. Communication path formation to utilize existing, wireless networked devices located between system controller and respective end devices.
    b. No additional hardware for formation of networked communication path between a system controller and end devices required.
    c. Automatic connection not required for wireless switches or battery-powered devices.

13. Networked control devices suitable for control of egress or emergency light sources without additional, externally mounted UL 924 shunting or 0-10 V(dc) disconnect devices, to provide a compliant sequence of operation while reducing the overall installation and wiring costs of the system. Capable of supporting the following sequence of operation:

    a. Line-Voltage Power Sensing: Devices listed as UL 924 emergency relays that automatically close load-control relay and provide 100 percent light output upon detection of loss of power sensed via line voltage connection to normal power.
    b. Normal-Power-Broadcast Sensing: Devices listed as UL 924 emergency relays that automatically close load-control relay and provide 100 percent light output upon loss of a wireless normal-power broadcast from devices connected to normal power.

D. System Integration Capabilities:

1. Capable of interface with third-party building management systems (BMS) to support two-way communication using BACnet/IP protocol, BACnet MS/TP protocol, and RESTful API including the following system integration capabilities:

    a. "Write" messages for control of individual devices, including control of relay and dimming output.
    b. "Write" messages for control of groups of devices through a single command, including control of relay and dimming output of all devices.
    c. "Read" messages for individual device status information.

        1) Available status will vary based on device type and capabilities, which may include relay state, dimming output, power measurement, occupancy sensor status, and photosensor light measurement.

    d. "Read" messages for group status information for occupancy, relay state, and dimming output.
    e. Activation of pre-defined system Global Profiles.

2. Activation of Global Profiles from third-party systems via dry contact closure output signals or digital commands via RS-232 or RS-485.

3. Activation of demand response levels from Demand Response Automation Servers (DRAS) via OpenADR 2.0a protocol.

E. Supported Sequence of Operations:

1. Control Zones:

a. Local Control Zones: Networked luminaires and intelligent lighting control devices installed in an area (also referred to as a group of devices) capable of transmitting and tracking occupancy sensor, photosensor, and manual switch information within at least 48 unique control zones to support different and reconfigurable sequences of operation within area. These will also be referred to as local control zones.
b. Adjacent Control Zones: Networked luminaires and intelligent lighting control devices capable of tracking occupancy broadcasts from adjacent zones. When this feature is enabled, luminaire output for a vacant zone will reduce to a configurable dimmed state if one or more adjacent zones are occupied. Luminaires will turn off when both primary and adjacent zones are vacant.
c. Global Control Zones: Networked luminaires and intelligent lighting control devices located in different areas able to transmit and track information within at least 128 system-wide control zones to support required sequences of operation that may span across multiple areas. Occupancy, photosensor inhibit, and switch commands available across multiple controllers.

2. Wall Station Capabilities:

a. Wall stations support the following capabilities:

1) On/Off of a local or global control zone.
2) Continuous dimming control of light level of a local or global control zone.

b. Multi-Way Control: Multiple wall stations capable of controlling the same local or global control zones, to support "multi-way" switching and dimming control.

3. Occupancy Sensing Capabilities:

a. Occupancy sensors configurable to control a local or global zone.
b. Multiple occupancy sensors capable of controlling the same local or global zones. This capability combines occupancy sensing coverage from multiple sensors without consuming multiple control zones.
c. Occupancy sensing sequence of operation modes:

1) On/Off Occupancy Sensing.
2) Partial-On Occupancy Sensing.
3) Partial-Off Occupancy Sensing.
4) Vacancy Sensing (Manual-On / Automatic-Off).

d. On/Off, Partial-On, and Partial-Off Occupancy Sensing Modes Sequence of Operation:

1) Occupancy automatically turn lights on to a designated level when occupancy is detected. Designated occupied light level support at least 100 dimming levels.
2) Occupancy sensors automatically turn lights off or to a dimmed state (Partial-Off) when vacancy occurs or if sufficient daylight is detected. Designated unoccupied dim level support at least 100 dimming levels.

3) System capable of combining Partial-Off and Full-Off operation by dimming lights to a designated level when vacant and turning the lights off completely after an additional time delay.
4) Photosensor readings, if enabled in occupancy sensing control zone, automatically adjust light levels during occupied or unoccupied conditions as necessary.
5) Wall station activation changes the dimming level or turn lights off as selected by the occupant. Lights optionally remain in this manually specified light level until the zone becomes vacant. Upon vacancy, normal sequence of operation resumes.

e. Vacancy Sensing or Manual-On/Automatic-Off Mode Sequence of Operation:

1) Activation of a wall station is required turn lights on. System capable of programming the zone to turn on to either a designated light level or previous user-set light level. Initially occupying the space without using a wall station must not result in lights turning on.
2) Occupancy sensors automatically turn lights off or to a dimmed state (Partial-Off) when vacancy occurs or if sufficient daylight is detected. Designated unoccupied dim level support at least 100 dimming levels.
3) System capable of dimming the lights when vacant and then turning the lights off completely after an additional time delay.
4) System capable of an "automatic grace period" immediately following detection of vacancy, during which time any detected occupancy results in the lights reverting to the previous level. After the grace period has expired, the use of a wall station is required to turn lights on.
5) Photosensor readings, if enabled in the Occupancy Sensing control zone, capable of automatically adjusting the light level during occupied or unoccupied conditions as necessary.
6) Wall station interaction changes the dimming level or turn lights off as selected by occupant. Lights remain at manually specified light level until zone becomes vacant; normal sequence of operation resumes upon vacancy.

f. Occupancy time delays before dimming or shutting off lights separately programmable for all control zones from 15 seconds to 2 hours.

4. Photosensor Sensing Capabilities (Automatic Daylight Sensing):

a. Photosensor devices configurable to control a local zone.
b. Photosensor-Based Control:

1) Continuous Dimming: Control zone automatically adjusts dimming output in response to photosensor readings, to maintain a minimum light level consisting of both electric light and daylight sources. Photosensor response configurable to adjust set point and dimming rates.

5. Schedule Capabilities:

a. System capable of time schedules for time-of-day to override devices including offsets from dusk and dawn.
b. System capable of providing a visible "blink warning" five minutes prior to the end of the schedule.
c. Wall stations may be programmed to provide timed extensions/overrides that turn the lights on for an additional time period.

1) Timed override/extension duration programmable for each individual device, zone of devices, or customized group of devices, from five minutes to 12 hours.

6. Global Profile Capabilities:

a. System capable of automatically modifying the sequence of operation for selected devices in response to any of the following:

1) Time-of-day schedule.
2) Contact closure input state.
3) Manually triggered wired wall station input.
4) RS-232/RS-485 command to wired input device.
5) BACnet input command.

b. Global Profile Capabilities:

1) Global Profiles stored within and executed from the system controller (via internal timeclock). Dedicated software host or server is not required to be online to support automatic scheduling and/or operation of Global Profiles.
2) Global Profile time-of-day schedules capable of recurrence settings including daily, specific days of week, every "n" number of days, weekly, monthly, and yearly. Lighting control global profile schedules support definition of start date, end date, end after "n" recurrences, or never ending.
3) Daylight savings time adjustments capable of being performed automatically, if desired.
4) Global Profile holiday schedules follow recurrent settings for specific U.S. holiday dates regardless if they always occur on a specific date or are determined by day/week of the month.
5) Global Profiles capable of being scheduled to run according to timed offsets relative to sunrise or sunset. Sunrise/sunset times automatically derived from location information using an astronomical clock.
6) Software management interface capable of displaying a graphic calendar view of profile schedules for each control zone.
7) Global Profiles capable of manual activation directly from system controller, specially programmed wired input devices, scene-capable wired wall stations, and software management interface.
8) Global Profiles selectable to apply to a single device, zone of devices, or customized group of devices.
9) Global Profile Configurable Parameters:

a) Fixture light level.
b) Occupancy time delay.
c) Response to occupancy sensors (including enabling/disabling response).
d) Response to daylight sensors (including enabling/disabling response).
e) Enabling/disabling of wall stations.

c. Local and Global Profiles backed up and stored on software's host server such that Profile backup can be applied to a replacement system controller or wired wall station.

7. System supports automated demand response capabilities with automatic reduction of light level to at least three levels of demand response, configurable for each output device.

2.3 SYSTEMS SOFTWARE INTERFACES

A. Management Interface:

1. Web-based management interface for remote system control, live status monitoring, and configuration of lighting control settings and schedules.
2. Compatible with industry-standard web browser clients.
3. Minimum of 100 unique password-protected user accounts.
4. Minimum of three user permission levels: read-only, read and change settings, and full administrative system access.
5. Capable of restricting access for user accounts to specific devices within the system.
6. All system devices capable of being given user-defined names.
7. Device identification information displayed in the Management interface including:

    a. Model number.
    b. Model description.
    c. Serial number or network ID.
    d. Manufacturing date code.
    e. Custom label.
    f. Parent network device.

8. Management interface capable of displaying live status of a networked luminaire or intelligent control device including:

    a. Luminaire on/off status.
    b. Dim level.
    c. Power consumption.
    d. Device temperature.
    e. PIR occupancy sensor status.
    f. Microphonic occupancy sensor status.
    g. Remaining occupancy time delay.
    h. Photosensor reading.
    i. Active Profiles.

9. Management interface capable of displaying and modifying the current active settings of a networked luminaire or intelligent control device including:

    a. Dimming trim levels.
    b. Occupancy sensor and photosensor enable/disable.
    c. Occupancy sensor time delay and light level settings.
    d. Occupancy sensor response (normal or vacancy).
    e. Photosensor setpoints and transition time delays.

10. Management interface capable of applying settings changes for a zone of devices or a group of selected devices using a single action that does not require the user to apply settings changes for each individual device.
11. Management interface capable of compiling a printable network inventory report.
12. Management interface capable of compiling a printable report detailing all system profiles.
13. All sensitive information stored encrypted.
14. System software updates available for automatic download and installation via the Internet.

B. System Energy Analysis and Reporting:

1. Intuitive graphical screens to facilitate simple viewing of system energy performance.

2. Energy Scorecard: Summarized display that indicates calculated energy savings in dollars or KWh.
3. Software calculates allocation of energy savings by control measures including occupancy sensors, photosensors, and manual switching.
4. Energy savings data calculated for the system as a whole.
5. Time-scaled graph showing all relay transitions.
6. Time-scaled graph showing zone occupancy time delays.
7. Time-scaled graph showing the total light level.
8. Software capable of storing information remotely onto an open-source, object-relational database, such as PostgreSQL.
9. Data stored in the database will be accessed utilizing an open standard, application programming interface, such as Open Database Connectivity (ODBC).

C. Visualization and Programming Interfaces:

1. System provides an optional web-based visualization interface that displays a graphical floorplan.
2. Graphical floorplan will offer the following types of system visualization:

    a. Full Device Option: Master graphic of entire building, by floor, showing each control device installed with zones outlined including:

        1) Controls embedded light fixtures.
        2) Controls devices not embedded in light fixtures.
        3) Daylight sensors.
        4) Occupancy sensors.
        5) Wall switches and dimmers.
        6) Scene controllers.
        7) Networked relays.
        8) Wired bridges.
        9) System Controllers.
        10) Wired relay panels.
        11) Group outlines.

    b. Group-Only Option: Master graphic of the entire building, by floor, showing only control groups outlined.
    c. Pan and zoom commands supported to allow smaller areas to be displayed on a larger scale simply by panning and zooming each floor's master graphic.
    d. Selecting any control device displays the following as applicable:

        1) Device catalog number.
        2) Device name and custom label.
        3) Device diagnostic information.
        4) Link to further information on device including status or current configuration.

3. Programming capabilities through the application will include the following:

    a. Switch, occupancy sensor, and photosensor zone configuration.
    b. Manual-on or automatic-on modes.
    c. Turn-on and dim to dimming levels.
    d. Occupancy sensor time delays and PIR sensitivity.
    e. Dual technology occupancy sensors sensitivity.
    f. Photosensor calibration adjustment and auto-setpoint.
    g. Multiple photosensor zone offset.
    h. Trim level settings.

i. Preset scene creation and copy for scene-capable devices.
j. Application of custom device labels to the Bluetooth Low-Energy Programming Devices and individual connected lighting control devices.
k. Fade rate settings.

D. Smartphone Programming Interface for Wired and Wireless Devices:

1. Interface provided for both Apple iOS and Android operating systems that allows configuration of lighting control settings.
2. Application supports configuration of wireless networked control devices.

a. Application access granted with valid user name and password.
b. Access to program information governed by permission system that allows users to share access with other users and restrict access to those who should not be able to reconfigure the equipment.
c. Indication of signal strength where multiple Bluetooth Low-Energy Programming Devices are available for configuration.

3. Application supports configuration or wired networked control devices.

a. Connected device access granted through user-defined passcode at initial install.
b. Indication of signal strength where multiple Bluetooth Low-Energy Programming Devices are available for configuration.

4. Programming Capabilities:

a. Switch, occupancy sensor, and photosensor group configuration.
b. Manual-on or automatic-on modes.
c. Turn-on and dim to dimming levels.
d. Occupancy sensor time delays and PIR sensitivity.
e. Dual technology occupancy sensors sensitivity.
f. Photosensor calibration adjustment and auto-setpoint.
g. Multiple photosensor zone offset.
h. Trim level settings.
i. Preset scene creation.
j. Application of custom device labels for individual connected lighting control devices.
k. Fade rate settings.

2.4 SYSTEM BACKBONE AND SYSTEM INTEGRATION EQUIPMENT

A. System Controller: Multi-tasking, real-time digital control processor consisting of modular hardware with plug-in enclosed processors, communication controllers, and power supplies.

1. Basis-of-Design Product: Subject to compliance with requirements, provide nLight; Acuity Brands Lighting, Inc.; nECY or comparable product by one of the following:

a. Cooper Industries, Inc.
b. Leviton Manufacturing Co., Inc.
c. Insert manufacturer's name.

2. System Controller Processor: 32-bit microprocessor operating at a minimum of 1 GHz.
3. System Controller Memory: Minimum of 512MB memory, with a minimum of 4GB non-volatile flash, to support operating system and databases.
4. System Controller Functions:

a. Time-based control of downstream wired and wireless network devices.
b. Linking into an Ethernet network.
c. Integration with Building Management Systems (BMS) and Heating, Ventilation and Air Conditioning (HVAC) equipment.
d. Connection to various software interfaces, including management interface, historical database and analytics interface, and visualization interface.

5. Integral web server to support system controller configuration and diagnostics with control and visualization of connected devices.

    a. Web Server Control Interface:

        1) Display associated devices within the context of a graphical floorplan.
        2) Provide control of output-capable devices through virtual sliders, toggle buttons, preset level widgets, and transparent layers on floorplan.
        3) Control Capabilities:

            a) Control of individual output devices, including control of relay state and analog dimming level where applicable.
            b) Control of local lighting control zones, including control of relay state and analog dimming level where applicable.
            c) Control of global lighting control zones, including control of relay state and analog dimming level where applicable.
            d) Control of Global Profiles.

    b. Visualization Interface:

        1) Customizable display with the ability to superimpose colored, transparent layers representing real-time property values, including occupancy status, dimming level status, light level status, and online or offline status where applicable.
        2) Ad hoc display of trended information via an intuitive values-over-time graph.
        3) Report Creation:

            a) Reports accept and graphically display trended status datasets for creator selected devices or zones of devices.
            b) Report information displayed over a user-defined interval and date range.
            c) Reports exportable to a standard CSV format.

6. Graphical touch screen to support configuration and diagnostics.
7. Minimum of three RJ-45 networked lighting control ports for connection to any of the following:

    a. Graphical touch screen.
    b. Wired communication bridges.
    c. Direct connection to networked wired luminaires and intelligent lighting control devices (up to 128 total devices per port).

8. Device will automatically detect all network-connected devices.
9. Capable of managing and operating a minimum of 750 networked devices (wired or wireless) per system controller.
10. Multiple System Controllers capable of connection via LAN for scalability to a minimum of 20,000 networked devices.

11. Supports BACnet/IP and BACnet MS/TP protocols to directly interface with BMS and HVAC equipment without additional protocol translation gateways.

    a. BACnet MS/TP Connection Speed: 9600 to 115200 baud rate.
    b. BACnet Testing Laboratory (BTL listed) using Device Profile BACnet Building Controller (B-BC) with outlined enhanced features.

12. Integral FIPS 140-2, Level 1 cryptographic module.
13. Supports RESTful API for control of BACnet objects, user management, date and time, and file management.
14. NEMA 1 enclosure with Class 1 and Class 2 separation.

    a. Power Supply Voltage: Specify Voltage V(ac).

15. Automatic algorithm to eliminate redundant, wireless networked paths to streamline communication between the system controller and end devices.
16. System Controller Security Provisions:

    a. Disallow the use of default passwords and require passwords to be updated prior to use.
    b. Support user role-based access, such as administrator, user, and viewer.
    c. Signed firmware to ensure that unmodified, authentic software is always installed.
    d. IP-based communication protected with strong encryption algorithms such as AES or TLS1.2+.
    e. Prevent rollback of firmware to firmware versions with known, critical vulnerabilities.
    f. Valid cybersecurity listing through a third party.

17. Cellular Remote Access: Cellular router and modem for remote access.

    a. Router supports remote access to at least five system controllers on its local area network or network subnet.
    b. Remote access capable of device setting updates, schedule updates, system performance optimization, and diagnostics.
    c. Remote access enabled through outbound communication from router to an outside source. Solutions that begin communication via inbound requests for network access are unacceptable.
    d. Router supports outbound communication to manufacturer-hosted portal using TLS1.2 or greater in-transit encryption over a cellular or Ethernet connection.
    e. Router with integral firewall to prevent unauthorized access to devices connected to its local area network port.
    f. Router includes cellular SIM capable of connection to AT&T, T-Mobile, Sprint, US Cellular, Alaska Wireless, Telefonica, Tellus, Bell, or Sasktel networks where carrier service is available.
    g. Outbound communication from the router limited to whitelisted endpoints. Devices that allow unrestricted communication are unacceptable.
    h. Outbound communication from router includes only lighting control system information.

2.5 WIRED NETWORKED DEVICES

A. Wired Networked Wall Switches, Dimmers, Scene Controllers:

1. Basis-of-Design Product: Subject to compliance with requirements, provide nLight; Acuity Brands Lighting, Inc.; nPODMA or comparable product by one of the following:

a. Cooper Industries, Inc.
b. Leviton Manufacturing Co., Inc.
c. Insert manufacturer's name.

2. Mounting: Suitable for installation in single-gang switch box.
3. Communication and low-voltage power delivered via standard low-voltage network cabling with RJ-45 connectors.
4. All switches detect valid communication and blink a unique LED pattern to visually indicate a potential wiring issue.
5. Devices with mechanical push buttons provide tactile and LED user feedback.
6. Devices with mechanical push buttons manufactured with custom button labeling.
7. Wall switch and dimmer options:

a. Number of control zones: Enter Number of zones per switch.
b. Control Types Supported:

1) On/Off.
2) On/Off/Dimming.
3) On/Off/Dimming/Correlated Color Temperature Control for specific luminaire types.

c. Color: Enter switch color.

8. Scene Controller Options:

a. Number of Scenes: Enter Number of scenes per switch.
b. Control Types Supported:

1) On/Off.
2) On/Off/Dimming.
3) Preset Level Scene Type.
4) On/Off/Dimming/Preset Level for Correlated Color Temperature.
5) Reprogramming of other devices within daisy-chained zone to implement user-selected lighting scene including manual start/stop from the scene controller, or optionally programmed automatic stop after a user-selectable duration between five minutes and 12 hours.
6) Selecting a lighting profile to be run by device's upstream controller to implement a selected lighting profile across multiple zones including manual start/stop from the scene controller, or optionally programmed automatic stop after a user selectable duration between five minutes and 12 hours.

c. Color: Enter switch color.

B. Networked Graphic Wall Stations:

1. Basis-of-Design Product: Subject to compliance with requirements, provide nLight; Acuity Brands Lighting, Inc.; nPOD TOUCH or comparable product by one of the following:

a. Cooper Industries, Inc.
b. Leviton Manufacturing Co., Inc.
c. Insert manufacturer's name.

2. Mounting: Suitable for installation in single-gang switch box.
3. Integral 3.5-inch (88 mm) capacitive full-color touch screen.
4. Power via polarity insensitive Class 2 low-voltage 15 to 24V (dc) power supply.

5. Device enables mobile application control of control zones and scenes through Bluetooth.
6. Communication over standard low-voltage network cabling with RJ-45 connectors.
7. User-customizable screen saver utilizing uploaded image file in common file format including jpg, png, gif, bmp, or tif.
8. Capable of configuration of all switches, dimmers, control zones, and lighting preset scenes via password-protected setup screens.
9. Graphic Wall Station Options:

    a. Number of Control Zones: Up to 16.
    b. Number of Scenes: Up to 16.
    c. Profile Scene Duration: User configurable from five minutes to 12 hours.
    d. Color: Enter switch color.

C. Digital Time Clock:

1. Basis-of-Design Product: Subject to compliance with requirements, provide nLight; Acuity Brands Lighting, Inc.; nDTC or comparable product by one of the following:

    a. Cooper Industries, Inc.
    b. Leviton Manufacturing Co., Inc.
    c. Insert manufacturer's name.

2. Controls a linear bus of lighting devices suppling all time functions without connection to a system controller.

    a. Programming of the linear bus of lighting devices must not require additional hardware, including computers, specialized dongles, or other connection devices.
    b. Programming of the linear bus exclusively done through the touch-screen interface.

3. Capable of up to 32 schedules. Each schedule consists of one set of On and Off times per day for each day of the week and for each of two holiday lists. Schedules assignable to any individual relay or group of relays.
4. Operates from non-volatile memory so that all system programming is retained indefinitely.
5. Mounted inside a relay panel to eliminate the necessity for additional enclosures for complete installation.
6. Capacitive 3.5-inch (88 mm), full-color touch screen.

D. Wired Networked Digital Key Switches:

1. Basis-of-Design Product: Subject to compliance with requirements, provide nLight; Acuity Brands Lighting, Inc.; nPODA KEY MNTN or comparable product by one of the following:

    a. Cooper Industries, Inc.
    b. Leviton Manufacturing Co., Inc.
    c. Insert manufacturer's name.

2. Mounting: Suitable for installation in single-gang switch box.
3. Communication and low-voltage power delivered via standard low-voltage network cabling with RJ-45 connectors.
4. All switches detect valid communication and blink a unique LED pattern to visually indicate a potential wiring issue.
5. LED user feedback to provide indication of on/off status of the programmed lights or scene, as well as indication of device power.
6. Digital Key Switch Options:

a. Control Types Supported:

1) On/Off.
2) On/Off/Dimming.
3) Preset Level Scene Type.
4) On/Off/Dimming/Preset Level for Correlated Color Temperature.
5) User-programmed local lighting scene run within a daisy-chained group including manual start/stop from the switch, or optionally programmed automatic-stop after a user-selectable duration between five minutes and 12 hours.
6) User-programmed global lighting profile run by an upstream controller across multiple groups including manual start/stop from the switch, or optionally programmed automatic-stop after a user-selectable duration between five minutes and 12 hours.

b. Color: Enter switch color.

E. Wired Networked Auxiliary Input / Output (I/O) Devices:

1. Basis-of-Design Product: Subject to compliance with requirements, provide nLight; Acuity Brands Lighting, Inc.; nIO series or comparable product by one of the following:

a. Cooper Industries, Inc.
b. Leviton Manufacturing Co., Inc.
c. Insert manufacturer's name.

2. Plenum rated.
3. Mounting: Mounting type.
4. Communication and low-voltage power delivered to each device via standard low-voltage network cabling with RJ-45 connectors.
5. Auxiliary Input/Output Devices Options:

a. Contact closure or pull-high input.

1) Input programmable to support maintained or momentary inputs that can activate local or global scenes and profiles, activate lights at a preconfigured level, ramp light level up or down, or toggle lights on/off.

b. 0-10V analog input.

1) Input supports zero to 10 V dimming output control from a dimmer switch.
2) Input programmable to function as a daylight sensor.

c. RS-232/RS-485 digital input.

1) Input supports activation of up to four local or global scenes and profiles, and on/off/dimming control of up to 16 local control zones.
2) Provides relay and dimming level status to external device (e.g. Touchscreen) when polled.

d. 0-10V dimming control output, capable of sinking up to 20mA.

1) Output programmable to support all standard sequence of operations supported by system.

e. Digital control output via eldoLED LEDcode communication.

1) Output programmable to support light intensity control, as well as optional correlated color temperature (CCT) control, of the connected luminaire.

F. Wired Networked DMX Interface Stations:

1. Basis-of-Design Product: Subject to compliance with requirements, provide nLight; Acuity Brands Lighting, Inc.; nPWDMX or comparable product by one of the following:

a. ETC.
b. Lutron.
c. <Insert manufacturer's name>.

2. Description: Multi-protocol, bidirectional DMX512 playback (snapshot) and lighting control gateway.

a. Capable of control of networked luminaire or all normal power lighting load types.
b. Capable of control of DMX lighting through:

1) DMX input for snapshot capture of lighting presets.
2) Live control of intensity, hue, and saturation of configured DMX Zones from connected stations.

c. Integral LED indicators for power, network traffic, processor health, identify, DMX port configuration and status.
d. Support recall of up to 16 (total):

1) Prerecorded scenes/snapshots for playback.
2) DMX zones.

e. Capable of preset playback as activated by any connected control station.
f. Capable of DMX pass-through for real-time output of incoming DMX levels.
g. Support four universes of ANSI E1.31 sACN-Streaming ACN (sACN), including priorities, for snapshot capture and recall.
h. Support ANSI E1.20 RDM with PC-based software.
i. Act as an ANSI E1.33 RDMnet controller.

3. General Requirements:

a. Operating Voltages:

1) PoE Class 2 Device.
2) 24 V(dc) (not used if using PoE), 7 W maximum power consumption.

b. Operating Temperature: Minus 32 to plus 113 deg F (0 to 45 deg C).
c. DIN-Rail Mounted on DIN 43880 (35/7.5) rail.
d. NEMA Type 1 enclosure.

1) Enclosure Size: 10 inches (260 mm) wide by 13 inches (330 mm) high by 4.5 inches (114 mm) deep.

4. Features:

a. Lighting control ports supports:

1) Communication through lighting control (RJ-45) ports that supply 40 mA of power to each device via standard Category 5e low-voltage network cabling.
2) Detection of valid communication and blinking of a unique LED pattern to visually indicate a potential wiring issue.

b. DMX Ports:

1) Comply with the requirements of ANSI E1.11 USITT DMX512-A standards.
2) Configurable as Input or Outputs.
3) Support ANSI E1.31 sACN.
4) Support Pathway Secure Streaming ACN (ssACN).
5) Comply with California Title 1.81.26.
6) Comply with ANSI E1.20 RDM.
7) Capable of withstanding fault voltages of up to 250 V(ac) without damage.

c. Dry contact closure input to connect with external control systems to control a lighting control zone or scene.

d. Ethernet Ports:

1) Support IEEE 802.3af Power-over-Ethernet in absence of 24 V(dc).
2) Support auto-negotiated 10/100MB connections speeds.
3) Support IEEE 802.1AB Link Layer Discovery Protocol.

e. Test Functions:

1) Operate without need of a configuration PC to check local wiring.
2) Test connectivity with DMX lights and networked luminaire or all normal power lighting load types.

f. Complies with the following:

1) RoHS 2011/65/EU + A1 2015/863.
2) FCC.

G. Wired Networked Occupancy and Photosensors:

1. Basis-of-Design Product: Subject to compliance with requirements, provide nLight; Acuity Brands Lighting, Inc.; Sensor Formfactor or comparable product by one of the following:

a. Cooper Industries, Inc.
b. Leviton Manufacturing Co., Inc.
c. Insert manufacturer's name.

2. Detect the presence of human activity within space and fully control the on/off function of lights.
3. Utilize passive infrared (PIR) technology, which detects occupant motion, to initially turn lights on from an off state, thus preventing false on conditions. Ultrasonic and Microwave-based sensing technologies are unacceptable.
4. Dual technology sensors used in locations where a second method of sensing is necessary to adequately detect maintained occupancy (such as in rooms with obstructions).
5. Dual technology sensors must have one sensing technology not motion dependent to detect occupancy. Acceptable dual technology includes PIR/Microphonics (also known as Passive Dual Technology or PDT), which detects both occupant motion and sounds

indicating occupants. Sensors where both technologies detect motion (PIR/Ultrasonic) are unacceptable.

6. All sensing technologies are acoustically passive, meaning they do not transmit sounds waves of any frequency (for example in the Ultrasonic range), as these technologies have the potential for interference with other electronic devices within the space (such as electronic white board readers and hearing devices). Acceptable detection technologies include Passive Infrared (PIR), and/or Microphonic technology. Ultrasonic and Microwave-based sensing technologies are unacceptable.
7. Ceiling, fixture, recessed, and corner mounted sensors available, with multiple lens options available customized for specific applications.
8. Communication and low-voltage power delivered to each device via standard low-voltage network cabling with RJ-45 connectors.
9. All sensors detect valid communication and blink a unique LED pattern to visually indicate a potential wiring issue.
10. Sensor programming parameter available and configurable remotely from the software and locally via the device push button.
11. Ceiling mount occupancy sensors include one integrated dry contact switching relay, capable of switching 1 A at 24 V, resistive only.
12. Sensors available with one or two occupancy "poles," each of which provides a programmable time delay.
13. Photosensor/daylight override, automatic dimming control, and low temperature/high humidity operation.
14. Photosensor provide one on/off set-point and include a dead band to prevent the artificial light from cycling. Delay incorporated into the photosensor to prevent rapid response to passing clouds.
15. Photosensor and dimming sensor's set-point and dead band automatically calibrated through the sensor's microprocessor by initiating an "Automatic Set-Point Programming" procedure. Min and max dim settings as well as set-point may be manually entered or modified.
16. Dead band setting verified and modified by the sensor automatically every time the lights cycle to accommodate physical changes in the space (i.e., furniture layouts, lamp depreciation, or lamp outages).
17. Dual zone option available for on/Off Photosensor, Automatic Dimming Control Photosensor, or Combination units. The secondary daylight zone capable of being controlled as an "offset" from the primary zone.

H. Wired Networked Wall Switch Sensors:

1. Basis-of-Design Product: Subject to compliance with requirements, provide nLight; Acuity Brands Lighting, Inc.; nWSXA LV or comparable product by one of the following:

    a. Cooper Industries, Inc.
    b. Leviton Manufacturing Co., Inc.
    c. Insert manufacturer’s name.

2. Mounting: Suitable for installation in single-gang switch box.
3. Communication and low-voltage power delivered via standard low-voltage network cabling with RJ-45 connectors.
4. All switches detect valid communication and blink a unique LED pattern to visually indicate a potential wiring issue.
5. Devices with mechanical push buttons provide tactile and LED user feedback.
6. Wall Switch Sensor Options:

    a. User Input Control Types: Input Control.
    b. Occupancy Sensing Technology: Sensor Technology.

c. Daylight Sensing Option: Inhibit Photosensor.
d. Color: Enter switch color.

I. Wired Networked Embedded Fixture Sensors:

1. Basis-of-Design Product: Subject to compliance with requirements, provide nLight; Acuity Brands Lighting, Inc.; nES or comparable product by one of the following:

a. Cooper Industries, Inc.
b. Leviton Manufacturing Co., Inc.
c. Insert manufacturer's name.

2. Network system sensors with occupancy sensors and/or dimming photosensors that can be embedded into luminaire such that only the lens shows on luminaire face.
3. Occupancy sensor detection pattern suitable for 7.5 to 20-ft. (2.2 to 6-m) mounting heights.
4. Embedded Sensor Options:

a. Occupancy Sensing technology: Sensor Technology.
b. Sensing Option: Sensor Option.

J. Wired Networked Power Packs:

1. Basis-of-Design Product: Subject to compliance with requirements, provide nLight; Acuity Brands Lighting, Inc.; nPP16 series or comparable product by one of the following:

a. Cooper Industries, Inc.
b. Leviton Manufacturing Co., Inc.
c. Insert manufacturer's name.

2. Plenum rated.
3. Communication will be delivered to each device via standard low-voltage network cabling with RJ-45 connectors.
4. Supply Voltage: Voltage V(ac).
5. Relay Output: Class 1 relay rated for 16 A at Voltage V(ac) and 1/2 HP at 120 V(ac).
6. Dimming Output: 0-10 VDC Dimming output.
7. Sink Current: 100 mA at 0-10 V(dc).
8. Mounting: Integral 1/2-inch (16-mm) chase nipple. Plastic clips into junction box are unacceptable.

K. Wired Networked Relay and Dimming Panel:

1. Basis-of-Design Product: Subject to compliance with requirements, provide nLight; Acuity Brands Lighting, Inc.; ARP or comparable product by one of the following:

a. Cooper Industries, Inc.
b. Leviton Manufacturing Co., Inc.
c. Insert manufacturer's name.

2. Outputs: Panel Size Individual relays per panel, with an equal number of individual 0-10 V(dc) dimming outputs.
3. Field Configurable Relays (FCR):

a. Field configurable to operate in single-, double-, or triple-pole relay groupings.
b. Field configurable to operate as normally closed or normally open.
c. Provides visual status of current state and manual override control of each relay.

d. Minimum Relay Contact Ratings:

1) 40 A at 120-480 V(ac) Ballast.
2) 16 A at 120-277 V(ac) Electronic.
3) 20 A at 120-277 V(ac) Tungsten.
4) 20 A at 48V (dc) Resistive.
5) 2 HP at 120 V(ac).
6) 3 HP at 240-277 V(ac).
7) 65kA SCCR at 480 V(ac).

4. Dimming Output Rating: Minimum of 100 mA sink current per dimming output.
5. Relay and dimming outputs individually programmable.
6. Listing: UL 924 for control of emergency lighting circuits.
7. Power Supply: Integrated Voltage V(ac) supply.
8. Low-Voltage Sensor Input:

a. Configurable to support any of the following input types:

1) Indoor Photosensor.
2) Outdoor Photosensor.
3) Occupancy Sensor.
4) Contact Closure.

b. Low-voltage sensor input provides 24 V(dc) power for sensor so additional auxiliary power supplies are not required.
c. Sensor input supports all standard sequence of operations.

9. Integrated Digital Time Clock for local schedule control.
10. Contact Closure Input: One for each group of eight output relays that acts as a panel override to activate the normally configured state of all associated relays (i.e., normally open or normally closed).
11. Panel supplies current limited low-voltage power to other networked devices connected via low-voltage network cable.
12. Enclosure:

a. Enclosure Rating: NEMA 1.
b. Mounting: Mounting Mechanism mounted.
c. Cover: Cover Mechanism.

L. Wired Networked Bluetooth Low-Energy Programming Device:

1. Basis-of-Design Product: Subject to compliance with requirements, provide nLight; Acuity Brands Lighting, Inc.; nIO BT or comparable product by one of the following:

a. Cooper Industries, Inc.
b. Leviton Manufacturing Co., Inc.
c. Insert manufacturer's name.

2. Plenum rated, inline wired, and screw mountable.
3. Communication and low-voltage power delivered to device via standard low-voltage network cabling with RJ-45 connectors.
4. Bluetooth communication allows connection from smartphone application for programming device settings within the local daisy-chain zone.
5. Device provides visual indication of remote Bluetooth connection via LED integrated into device enclosure such that it is visible from all angles while the zone is being programmed.

M. Wired Networked Communication Bridge:

1. Basis-of-Design Product: Subject to compliance with requirements, provide nLight; Acuity Brands Lighting, Inc.; nBRG or comparable product by one of the following:

   a. Cooper Industries, Inc.
   b. Leviton Manufacturing Co., Inc.
   c. Insert manufacturer's name.

2. Suitable for surface mount to a standard 4 by 4-inch (100 by 100 mm) square junction box.
3. Communication Ports: Eight RJ-45 ports for connection to lighting control zones (up to 128 devices per port), additional network bridges, and System Controller.
4. Capable of aggregating communication from multiple lighting control zones for purposes of minimizing backbone wiring requirements back to System Controller.
5. Power Input: Class 2 low-voltage supplied locally via a directly wired power supply.
6. Wired Bridge capable of redistributing power from its local supply and connected lighting control zones with excess power to lighting control zones with insufficient local power. Architecture enables loss of power to a particular area to be less impactful on network lighting control system.

2.6 WIRELESS NETWORKED DEVICES

A. Wireless Networked Wall Switches, Dimmers:

1. Basis-of-Design Product: Subject to compliance with requirements, provide nLight; Acuity Brands Lighting, Inc.; rPOD series or comparable product by one of the following:

   a. Cooper Industries, Inc.
   b. Leviton Manufacturing Co., Inc.
   c. Insert manufacturer's name.

2. Mounting: Suitable for installation in single-gang switch box.
3. Wireless Communication:

   1) Dual 900 MHz IEEE 802.15.4 based and 2.4 GHz, Version 4.0+ Bluetooth.
   2) Security: AES-128 bit.

4. Power Supply: Power source.
5. Mechanical push buttons provide tactile and LED user feedback during button press.
6. Mechanical push buttons available with custom button labeling.
7. Wall Switches and Dimmer Options:

   a. Number of Control Zones: Control Zones.
   b. Control Types Supported: On/Off and on/Off/Dimming.

8. Scene Switch Options:

   a. Number of Scenes: Number of Scenes.
   b. Control Types Supported: On/Off, On/Off/Dimming, and Preset Level Scene Type.

9. Color: Enter switch color.

B. Wireless Networked Embedded Fixture Control Devices:

1. Basis-of-Design Product: Subject to compliance with requirements, provide nLight; Acuity Brands Lighting, Inc.; rIO or comparable product by one of the following:

    a. Cooper Industries, Inc.
    b. Leviton Manufacturing Co., Inc.
    c. Insert manufacturer's name.

2. Wireless Communication:

    a. Dual 900 MHz IEEE 802.15.4 based and 2.4 GHz, Version 4.0+ Bluetooth.
    b. Security: AES-128 bit.

3. Power Supply: Standard low-voltage wiring typically associated with an LED driver.
4. Suitable for installation within a luminaire such that the control device is not visible on the luminaire face.
5. Devices available with integrated and remote antennas such that devices can be installed within sealed container without detriment to wireless strength.
6. Antenna Color: Enter antenna color.
7. Dimming Output: Enter dimming protocol.
8. Power loss detection, where unit powers and controls the emergency circuit. Loss of wireless broadcasts from a dedicated normal-power-connected device forces unit to shunt closed, go to full bright, and ignore all system commands until main power is restored.

C. Wireless Networked Indoor Load Controllers with Occupancy and Photosensors:

1. Basis-of-Design Product: Subject to compliance with requirements, provide nLight; Acuity Brands Lighting, Inc.; rLSXR or comparable product by one of the following:

    a. Cooper Industries, Inc.
    b. Leviton Manufacturing Co., Inc.
    c. Insert manufacturer's name.

2. Wireless Communication:

    a. Dual 900 MHz IEEE 802.15.4 based and 2.4 GHz, Version 4.0+ Bluetooth.
    b. Security: AES-128 bit.

3. Detect the presence of human activity within space and fully control the on/off function of lights.
4. Utilizes passive infrared (PIR) technology, which detects occupant motion, to initially turn lights on from an off state, thus preventing false on conditions. Ultrasonic and Microwave-based sensing technologies are unacceptable.
5. Dual technology sensors used in locations where a second method of sensing is necessary to adequately detect maintained occupancy (such as in rooms with obstructions).
6. Dual technology sensors must have one sensing technology not motion dependent to detect occupancy. Acceptable dual technology includes PIR/Microphonics (also known as Passive Dual Technology or PDT), which detects both occupant motion and sounds indicating occupants. Sensors where both technologies detect motion (PIR/Ultrasonic) are unacceptable.
7. All sensing technologies are acoustically passive, meaning they do not transmit sound waves of any frequency (for example in the Ultrasonic range), as these technologies have the potential for interference with other electronic devices within the space (such as electronic white board readers and hearing devices). Acceptable detection technologies

include Passive Infrared (PIR) and/or Microphonic technology. Ultrasonic and Microwave-based sensing technologies are unacceptable.
8. Sensor programming parameters available and configurable remotely.
9. Ceiling, fixture, and junction box mounted sensors available, with multiple lens options available customized for specific applications.
10. Integral daylight photosensor for programmable daylight harvesting.
11. Photosensor includes adjustable illumination set-point and dead band to prevent the artificial light from cycling. Set-point and dead band capable of automatically calibrating through an "Automatic Set-Point Programming" procedure. Min and max dimming settings and set-point may be manually entered or modified.
12. Dead band setting verified and modified by the sensor automatically every time the lights cycle to accommodate physical changes in the space (i.e., furniture layouts, lamp depreciation, or lamp outages).
13. Power loss detection, where unit powers and controls the emergency circuit. Loss of wireless broadcasts from a dedicated normal-power-connected device forces unit to shunt closed, go to full bright, and ignore all system commands until main power is restored.
14. Power Monitoring: Integral current measurements on output with 3 percent accuracy when measuring loads 225 mA or greater.

D. Wireless Networked Indoor Occupancy and Photosensors:

1. Basis-of-Design Product: Subject to compliance with requirements, provide nLight; Acuity Brands Lighting, Inc.; Enter sensor choice or comparable product by one of the following:

   a. Cooper Industries, Inc.
   b. Leviton Manufacturing Co., Inc.
   c. Insert manufacturer's name.

2. Wireless Communication:

   a. Dual 900 MHz IEEE 802.15.4 based and 2.4 GHz, Version 4.0+ Bluetooth.
   b. Security: AES-128 bit.

3. Detect the presence of human activity within space and fully control the on/off function of lights.
4. Utilizes passive infrared (PIR) technology, which detects occupant motion, to initially turn lights on from an off state, thus preventing false on conditions. Ultrasonic and Microwave-based sensing technologies are unacceptable.
5. Dual technology sensors used in locations where a second method of sensing is necessary to adequately detect maintained occupancy (such as in rooms with obstructions).
6. Dual technology sensors must have one sensing technology not motion dependent to detect occupancy. Acceptable dual technology includes PIR/Microphonics (also known as Passive Dual Technology or PDT), which detects both occupant motion and sounds indicating occupants. Sensors where both technologies detect motion (PIR/Ultrasonic) are unacceptable.
7. All sensing technologies acoustically passive, meaning they do not transmit sound waves of any frequency (for example in the Ultrasonic range), as these technologies have the potential for interference with other electronic devices within the space (such as electronic white board readers and hearing devices). Acceptable detection technologies include Passive Infrared (PIR), and/or Microphonic technology. Ultrasonic and Microwave-based sensing technologies are unacceptable.
8. Sensor programming parameters available and configurable remotely.
9. Ceiling, fixture, and junction box mounted sensors available, with multiple lens options available customized for specific applications.

10. Dry Contact Output: One integrated dry contact switching relay, capable of switching 100 mA at 24 V, resistive only.
11. Integral daylight photosensor for programmable daylight harvesting.
12. Photosensor includes adjustable illumination set-point and dead band to prevent the artificial light from cycling. Set-point and dead band capable of automatically calibrating through an "Automatic Set-Point Programming" procedure. Min and max dimming settings and set-point may be manually entered or modified.
13. Dead band setting verified and modified by the sensor automatically every time the lights cycle to accommodate physical changes in the space (i.e., furniture layouts, lamp depreciation, or lamp outages).

E. Wireless Networked Outdoor Occupancy and Photosensors:

1. Basis-of-Design Product: Subject to compliance with requirements, provide nLight; Acuity Brands Lighting, Inc.; rSBOR or comparable product by one of the following:

    a. Cooper Industries, Inc.
    b. Leviton Manufacturing Co., Inc.
    c. Insert manufacturer's name.

2. Wireless Communication:

    a. Dual 900 MHz IEEE 802.15.4 based and 2.4 GHz, Version 4.0+ Bluetooth.
    b. Security: AES-128 bit.

3. Mounting: Enter required mounting.
4. Supply Voltage: Enter voltage V(ac).
5. Detect the presence of human activity within space and fully control the on/off function of lights.
6. Utilizes passive infrared (PIR) technology, which detects occupant motion, to initially turn lights on from an off state, thus preventing false on conditions. Ultrasonic and Microwave-based sensing technologies are unacceptable.
7. Sensors detect valid communication and blink a unique LED pattern to visually indicate a potential issue.
8. Sensor programming parameters available and configurable remotely.
9. Available with multiple lens options available for various mounting heights.
10. Power Monitoring: Integral current measurements on output with 3 percent accuracy when measuring loads 225 mA or greater.
11. Integral daylight photosensor for programmable daylight harvesting.
12. Photosensor includes adjustable illumination set-point and dead band to prevent the artificial light from cycling. Set-point and dead band capable of automatically calibrating through an "Automatic Set-Point Programming" procedure. Min and max dimming settings and set-point may be manually entered or modified.
13. Dead band setting verified and modified by the sensor automatically every time the lights cycle to accommodate physical changes in the space (i.e., furniture layouts, lamp depreciation, or lamp outages).
14. Power loss detection, where unit powers and controls the emergency circuit. Loss of wireless broadcasts from a dedicated normal-power-connected device forces unit to shunt closed, go to full bright, and ignore all system commands until main power is restored.

F. Wireless Networked Indoor Embedded Sensors:

1. Basis-of-Design Product: Subject to compliance with requirements, provide nLight; Acuity Brands Lighting, Inc.; Enter sensor choice or comparable product by one of the following:

a. Cooper Industries, Inc.
b. Leviton Manufacturing Co., Inc.
c. Insert manufacturer's name.

2. Wireless Communication:

a. Dual 900 MHz IEEE 802.15.4 based and 2.4 GHz, Version 4.0+ Bluetooth.
b. Security: AES-128 bit.

3. Sensors consisting of occupancy sensors and dimming photosensor suitable for installation within a luminaire such that only the lens is visible on luminaire face.
4. Power Supply: Standard low-voltage wiring typically associated with an LED driver.
5. Devices available with integrated and remote antennas such that devices can be installed within sealed container without detriment to wireless strength.
6. Antenna Color: Enter antenna color**.**
7. Dimming Output: Enter dimming protocol.
8. Detect the presence of human activity within space and fully control the on/off function of lights.
9. Utilizes passive infrared (PIR) technology, which detects occupant motion, to initially turn lights on from an off state, thus preventing false on conditions. Ultrasonic and Microwave-based sensing technologies are unacceptable.
10. Sensors detect valid communication and blink a unique LED pattern to visually indicate a potential issue.
11. Sensor programming parameters available and configurable remotely.
12. Available with multiple lens options available for various mounting heights.
13. Integral daylight photosensor for programmable daylight harvesting.
14. Photosensor includes adjustable illumination set-point and dead band to prevent artificial light from cycling. Set-point and dead band capable of automatically calibrating through an "Automatic Set-Point Programming" procedure. Min and max dimming settings and set-point may be manually entered or modified.
15. Dead band setting verified and modified by sensor automatically every time lights cycle to accommodate physical changes in space (i.e., furniture layouts, lamp depreciation, or lamp outages).
16. Power loss detection, where unit powers and controls the emergency circuit. Loss of wireless broadcasts from a dedicated normal-power-connected device forces unit to shunt closed, go to full bright, and ignore all system commands until main power is restored.

G. Wireless Networked Outdoor Embedded Sensors:

1. Basis-of-Design Product: Subject to compliance with requirements, provide nLight; Acuity Brands Lighting, Inc.; Enter Sensor Choice or comparable product by one of the following:

a. Cooper Industries, Inc.
b. Leviton Manufacturing Co., Inc.
c. Insert manufacturer's name.

2. Wireless Communication:

a. Dual 900 MHz IEEE 802.15.4 based and 2.4 GHz, Version 4.0+ Bluetooth.
b. Security: AES-128 bit.

3. Sensors consisting of occupancy sensors and dimming photosensor suitable for installation within a luminaire such that only the lens is visible on luminaire face.
4. Power Supply: Standard low-voltage wiring typically associated with an LED driver.
5. Color: Enter color.

6. Ingress Protection: Minimum IP66.
7. Devices available with remote antennas such that devices can be installed within sealed container without detriment to wireless strength.
8. Detect the presence of human activity within space and fully control the on/off function of lights.
9. Utilizes passive infrared (PIR) technology, which detects occupant motion, to initially turn lights on from an off state, thus preventing false on conditions. Ultrasonic and Microwave-based sensing technologies are unacceptable.
10. Sensors detect valid communication and blink a unique LED pattern to visually indicate a potential issue.
11. Sensor programming parameters available and configurable remotely.
12. Available with multiple lens options available for various mounting heights.
13. Integral daylight photosensor for programmable daylight harvesting.
14. Photosensor includes adjustable illumination set-point and dead band to prevent artificial light from cycling. Set-point and dead band capable of automatically calibrating through an "Automatic Set-Point Programming" procedure. Min and max dimming settings and set-point may be manually entered or modified.
15. Dead band setting verified and modified by the sensor automatically every time the lights cycle to accommodate physical changes in the space (i.e., furniture layouts, lamp depreciation, or lamp outages).
16. Power loss detection, where unit powers and controls the emergency circuit. Loss of wireless broadcasts from a dedicated normal-power-connected device forces unit to shunt closed, go to full bright, and ignore all system commands until main power is restored.

H. Wireless Networked Power Packs:

1. Basis-of-Design Product: Subject to compliance with requirements, provide nLight; Acuity Brands Lighting, Inc.; rPP series or comparable product by one of the following:

    a. Cooper Industries, Inc.
    b. Leviton Manufacturing Co., Inc.
    c. Insert manufacturer's name.

2. Wireless Communication:

    a. Dual 900 MHz IEEE 802.15.4 based and 2.4 GHz, Version 4.0+ Bluetooth.
    b. Security: AES-128 bit.

3. Plenum rated.
4. Supply Voltage: Enter voltage V(ac).
5. Relay Output: Class 1 relay rated for 20 A and 1.5 HP at 120 to 277 V(ac) and 5 A and 0.5 HP at 480 V(ac).
6. Dimming Output: 0-10 V(dc).
7. Sink Current: 150 mA at 0-10 V(dc).
8. Antenna Type: Antenna.
9. Programming parameters available and configurable remotely.
10. Mounting: Integral 1/2-inch (16-mm) chase nipple. Plastic clips into junction box are unacceptable.
11. Power Packs Options:

    a. Power Pack capable of full 20-Amp switching of all normal power lighting load types, with optional 0-10V dimming output capable of up to 150 mA of sink current.
    b. Power Packs capable of full 20-Amp switching of general-purpose receptacle (plug-load) control.

c. Listing: UL 924 for control of emergency lighting circuits, field configurable for two distinct sequence of operation:

1) Power sense of normal power feed, where unit powers and controls emergency circuit, and loss of the normal power sense circuit forces the power pack to shunt closed, go to full bright, and ignore all system commands until normal power is restored.
2) Power loss detection, where unit powers and controls the emergency circuit. Loss of wireless broadcasts from a dedicated normal-power-connected device forces unit to shunt closed, go to full bright, and ignore all system commands until main power is restored.

d. Power Monitoring: Integral current measurements on output with 3 percent accuracy when measuring loads Enter current mA or greater.
e. Chicago Plenum External Antenna:

1) Mounting: 1/2-inch (16-mm).
2) Ingress Protection: IP67.

I. Wireless Networked Communication Adapter:

1. Basis-of-Design Product: Subject to compliance with requirements, provide nLight; Acuity Brands Lighting, Inc.; nECYD or comparable product by one of the following:

a. Cooper Industries, Inc.
b. Leviton Manufacturing Co., Inc.
c. Insert manufacturer's name.

2. Wireless Communication:

a. Dual 900 MHz IEEE 802.15.4 based and 2.4 GHz, Version 4.0+ Bluetooth.
b. Security: AES-128 bit.

3. Capable of supporting a minimum of 750 networked wireless devices per adapter.
4. Interface: USB connection.
5. Ingress Protection: Minimum IP66.
6. Mounting: Integral 1/2-inch (16-mm) chase nipple. Minimum 16 ft. (4.8 m) USB cable and optional cable extenders for remote mounting.

PART 3 - EXECUTION

3.1 INSTALLATION OF WIRING

A. Wiring Method: Comply with Section 260519 "Low-Voltage Electrical Power Conductors and Cables" and Section 260523 "Control-Voltage Electrical Power Cables." Minimum conduit size is 1/2 inch (13 mm).

1. Comply with requirements for cable trays specified in Section 260536 "Cable Trays for Electrical Systems."
2. Comply with requirements for raceways and boxes specified in Section 260533.13 "Conduits for Electrical Systems," and Section 260533.16 "Boxes and Covers for Electrical Systems,"

B. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

3.2 IDENTIFICATION

A. Identify system components, wiring, cabling, boxes, cabinets, and terminals. Comply with identification requirements specified in Section 260553 "Identification for Electrical Systems."

B. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with Section 260553 "Identification for Electrical Systems."

C. Identify all controls with device address.

D. Label each device cable within 6 inches (152 mm) of connection to bus power supply or termination block.

3.3 FIELD QUALITY CONTROL

A. Acceptance Testing Preparation:

1. Test continuity of each circuit.

B. Field tests and inspections must be witnessed by Enter witnesses.

C. Tests and Inspections: Enter responsible party test inspections.

1. Test each zone using local and remote-control hardware.
2. Perform each visual and mechanical inspection and electrical test stated in NETA ATS. Certify compliance with test parameters.

D. Nonconforming Work:

1. Lighting controls will be considered defective if they do not pass tests and inspections.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

E. Field Test Reports: Enter responsible party field test reports.

1. Prepare functionality and inspection reports, including a certified report that identifies controls included and describes test results. Include notation of deficiencies detected, remedial action taken, and observations made after remedial action.
2. Include list of all points created from actual tests of all addressed control points for lamps, ballasts, manual controls, and sensors.

3.4 REMOTE ACCESS

A. Digital network lighting control system capable of remote access by manufacturer with the following features:

1. System diagnostics including detection of fault condition in hardware or connected devices.

2. Access to all connected devices for complete programming including scheduling of time-of-day events and device parameters necessary to meet required sequence of operations.
3. Browser-based interface to verify system functionality.
4. On-demand access to manufacturer technical support for remote troubleshooting, diagnostics, configuration, and programming.
5. Owner training on the digital network lighting control system available remotely.

B. Remote access system fully functional over commercial cellular connection or Internet-connected ethernet network.

C. All hardware associated with remote access including cellular modem and cellular antenna are to remain on-site regardless of warranty or cellular contract status.

3.5 SYSTEM STARTUP

A. Enter responsible party startup service.

1. Complete installation and startup check in accordance with manufacturer's published instructions.
2. Activate luminaires and verify that all maximum output levels match output levels detailed in an Owner-approved sequence of operations.
3. Confirm correct communications wiring, initiate communications between control devices and controller/gateways, and program the lighting control system in accordance with approved configuration schedules, time-of-day schedules, and input override assignments.
4. Program network devices to meet required sequence of operations.
5. Program and verify all sequence of operations.
6. Create backup of system programming.
7. Assist in installation of system software on customer-provided workstation or server.

8. Verify bidirectional communication of manufacturer-provided cellular router with manufacturer-managed remote access portal.
9. Insert startup steps if any.

10. Commissioning Walkthrough: Enter responsible party to demonstrate lighting control system functionality and verify the system meets the specified Project requirements.

3.6 CLOSEOUT ACTIVITIES

A. Enhanced Documentation: Engage lighting system manufacturer to provide comprehensive system documentation including detailed programming, sequence of operation data per Project specifications, and related code requirements.

B. Training: Engage lighting system manufacturer to provide comprehensive system overview, software overview, and documentation relating to system operation and maintenance.

3.7 PROTECTION

A. After installation, protect digital network lighting controls from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Owner.

3.8 MAINTENANCE

A. Engage a factory-authorized service representative to perform on-site system adjustments.

1. On-Site Occupancy Adjustments: When requested within Insert number months from date of Substantial Completion, provide on-site settings adjustments to suit actual occupied conditions. Provide up to Insert number visits to Project during other-than-normal occupancy hours for this purpose.
2. Prepare and submit report after each visit that details activities performed.

B. Engage a factory-authorized service representative to perform remote system adjustments.

1. Remote Occupancy Adjustments: When requested within Insert numbermonths from date of Substantial Completion and project registration with lighting control system manufacturer, provide remote settings adjustments to suit actual occupied conditions. Provide up to Insert number sessions to Project during other-than-normal occupancy hours for this purpose.

    a. System to include manufacturer-provided cellular communication hardware and connection to the system for a minimum of Insert number months after substantial completion to allow for factory representative assistance with settings adjustments and system sustainment.
    b. For the remaining duration of the maintenance term, or in the event cellular connectivity is not available, manufacturer assistance must be available through an Owner-provided, Internet-connected network.

2. Prepare and submit report after each session that details activities performed.

C. Maintenance Service Agreement:

1. Beginning at Substantial Completion, verify that maintenance service agreement includes 12 months' full maintenance by manufacturer's authorized service representative.
2. Include Enter frequency Enter location preventive maintenance.
3. Preventative maintenance to include:

    a. System diagnostic reports.
    b. System performance checks.
    c. Device firmware updates.
    d. Programming adjustment as required for proper lighting system operation.
    e. Expedited factory direct warranty processing, replacement, and programming of defective components.

4. Verify that parts and supplies are manufacturer's authorized replacement parts and supplies.

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SECTION 26 24 13

SWITCHBOARDS, 600 VOLTS AND BELOW

PART 1 GENERAL

1.01 **DESCRIPTION OF WORK:** The work of this Section consists of providing switchboards, as shown on the Drawings and as described herein.

1.02 RELATED WORK:

A. See the following Specification Sections for work related to the work in this Section.

1. 26 05 19 Line Voltage Wire and Cable
2. 26 22 00 Transformers
3. 26 28 16 Circuit Breakers

1.03 SUBMITTALS:

A. Shop Drawings - As specified in Section 26 05 00 and Division 01. For each switchboard furnished under this Contract, submit manufacturer's name, catalog data, and the following information:

1. Switchboard type.
2. Main bus and terminal connection sizes.
3. Location of line connections.
4. Section dimensions.
5. Gutter space.
6. Gauge of boxes and fronts.
7. Finish data.
8. Voltage rating.
9. Breaker manufacturer, types, trip ratings, and interrupting ratings.

B. Before construction of the main (service) switchboard, the contractor shall deliver two or more copies of the switchboard submittal to P.G.&E. for their approval. The contractor shall deliver one P.G.&E. approved copy of the submittal to the Electrical Engineer for record.

C. Submit operation and maintenance data for switchboards, and circuit breakers including nameplate data, parts lists, manufacturer's circuit breaker time current coordination curves, factory and field test reports, recommended maintenance procedures and typewritten as-built panel and switchboard schedules. Submit in accordance with Division 01.

1.04 WARRANTY

A. Manufacturer shall warrant equipment to be free from defects in materials and workmanship for the lesser of one (1) year from date of installation or eighteen (18) months from date of purchase

PART 2 – PRODUCTS

2.01 SWITCHBOARDS:

A. General: Switchboards shall be designed, built and tested in accordance with applicable portions of the latest NEMA, EUSERC, and Underwriter Laboratories standards and the latest requirements of the California Electrical Code. All sections and devices shall be UL listed and labeled.

1. Switchboards shall be dead front, completely self-supporting structure of the required number of vertical sections bolted together to form one metal, totally enclosed, switchboard. Sides, top, and rear covers shall be code gauge steel, bolted to the switchboard structure.

2. The switchboard shall be furnished with phase and neutral busses of the amps, volts and phase shown on the Drawings. The bus shall extend the full length of the switchboard. Tapered bus is not acceptable. The switchboard sections, when called for on the plans, shall be as follows:

   a. Metering Section and landing lugs; Fully Pacific Gas & Electric Company compatible.

   b. All sections shall include full capacity busing between sections.

   c. All sections shall be front aligned and shall have front-connected devices.

3. All buses shall be silver plated copper, supported with high impact, non-tracking insulating material, braced to withstand the mechanical forces exerted during short circuit conditions. The current density of the bus shall not exceed 1000 amperes per square inch of cross section area or the switchboard bussing shall be of sufficient cross-sectional area to meet UL standard 891 for temperature rise. Provisions shall be provided for future splicing of additional sections from either end. The neutral bus shall be 100% rated.

4. A ground bus shall be furnished secured to each vertical section structure, and shall extend the entire length of the switchboard. The ground bus shall be sized per UL standard 891 and be of the same material as the through bus.

5. The neutral bus in the feeder sections shall be no further than 20 inches from the front of the switchboard.

6. Vertical main bus bars shall be furnished full height to accommodate future branch devices.

7. The switchboard shall be furnished and installed complete with all underground pull sections, utility sections, main device and feeder sections as indicated on the Drawings. Underground pull sections, utility cable termination, transformer and metering sections shall be in accordance with Pacific Gas and Electric Company requirements.

8. The main device, where indicated to be individually mounted, shall be completely isolated from the utility and the feeder sections of the switchboard, both in the device section and the cable section of the switchboard cubicle. The cable section shall also be isolated from the main horizontal bus. The main device cubicle shall have UL service equipment label.

9. Feeder devices shall be group-mounted and be front accessible, furnished with vertical wiring gutter on the front of the distribution sections. Wiring gutters shall be furnished with hinged, code gauge steel formed covers. Unused device space shall be covered with blank code gauge steel covers.

10. All vertical sections comprising the switchboard shall be aligned front and rear.

11. Switchboards for outdoor installation shall be furnished in [stainless steel] NEMA 3R non-walk-in enclosures provided with thermostatically controlled space heaters in each vertical section. Space heaters shall be powered from a circuit breaker protected circuit originating within the switchboard and shall be sized adequately to prevent the formation of condensation. Space heater shall be suitable for operation at 120V AC.

12. All steel surfaces are to be chemically cleaned and treated, providing a bond between paint and metal surfaces to help prevent the entrance of moisture and formation of rust under the paint finish. Switchboard exterior shall be furnished with a grey enamel finish color over a rust inhibiting primer, unless otherwise noted.

B. Circuit Breakers

1. Circuit breakers, unless otherwise indicated, shall be the molded case type with ratings as indicated on the Drawings. Circuit breakers shall meet the requirements specified under Section 262816- Circuit Breaker.

2. Main circuit breakers, where indicated to be Molded case type, shall be 80 [100] percent rated, with the frame size and trip plug ratings shown.

3. Circuit breakers equipped with Ground-Fault Equipment Protection shall be capable of the following types of ground-fault protection: residual, source ground return, and modified differential.

   a. Ground-fault settings for circuit breaker sensor sizes 1200 A or below shall be adjustable from 0.2 to 1.0 times in 0.1 in increments. The ground-fault settings for circuit breakers above 1200 A shall be adjustable from 500 to 1200 A.

4. Circuit breakers with an arc Energy-Reducing Maintenance Switch (ERMS) setting shall be equipped with a separate trip curve to reduce incident energy.

   a. The ERMS trip curve shall be selected through physical selector. Trip unit [remote indicator light] shall indicate when trip unit is operating in ERMS mode.

   b. Trip unit shall operate in Fast Instantaneous trip mode, 25 to 30 mS, when ERMS trip curve is active.

   c. Engaging/disengaging the ERMS mode or making settings changes to the ERMS settings shall be restricted to authorized personnel by limiting access to such features by padlocks or passwords to ensure safety of the personnel working with the equipment.

C. Customer Metering

1. Instrument Transformers

a. Current transformers shall be window type conforming to, one per phase, Square D Company Class 4210, General Electric JAG-O or equal.

b. Potential transformers shall be fixed mounted, type Square D Company Class 4210, General Electric JVM, or equal.

2. Power Monitors and Meters

a. The Customer Metering equipment shall be manufactured by Square D Company, General Electric or equal.

b. Substitutions: substitutions shall be made only after proper verification

c. The switchboard shall be metered using:

i. [Square D Type PM 650] [Square D Type CM 2350]

ii. [Square D Type PM 650]

(A). Digital Power Meter with 0.25% accuracy with the following features:

(B). A, V, kW, kVAR, kVA, PF, F, kWh, kVARh, kVAh, KYZ, RS-485 communications, THD, Demand, kWd, kVARd, kVAd, date/time stamping,

(C). predicted power demand, onboard alarms, min/max. readings, data log, event log

iii. [Square D Type CM 2350]

(A). Digital Circuit Monitor with 0.2% accuracy with the following features:

(B). A, V, kW, kVAR, kVA, PF, F, THD, K-Factor, kWh, kVARd, kVAd, kVARh, kVAh, KYZ output, RS-485 communication port, kWd, kVARd, kVAd, date/time stamping, predicted power demand, onboard alarms, min/max. readings, data log, event log, extend memory (100k), wave form capture, and disturbance monitoring

D. Manufacturer

a. The switchboard shall be Square D, Siemens, [I.E.M], [General Electric], [or] [Eaton Cutler Hammer].

PART 3 – EXECUTION

3.01 INSTALLATION:

A. Switchboards shall be installed where indicated on the Drawings, and in accordance with the manufacturer's instructions.

B. A 1” conduit shall be installed for new PG& E services from the PG& E Metering Section to the Main Telephone Terminal Board.

C. At switchboards located indoors, a 2” conduit and pull tape shall be installed from outside the switchboard meter cabinet to a location on the exterior of the building. The installation shall meet PG&E Green Book requirements.

D. Circuit breakers for solidly grounded Wye Electrical Systems of more than 150V to Ground and 1000A or larger shall be equipped with Ground-Fault Equipment Protection.

E. Circuit breakers 1200A and larger shall be equipped with a separate trip curve for an arc Energy-Reducing Maintenance Switch (ERMS) setting to reduce incident energy.

3.02 MOUNTING:

A. Switchboards shall be mounted on a concrete pad, as indicated on the drawings. Reinforcing shall be as shown on the Drawings. The top surface of the pad shall be 2 inches above the surrounding surface.

B. The switchboard shall be bolted to the pad with ½ inch diameter bolts minimum at each corner of each section unless otherwise noted.

C. The switchboard shall be seismically qualified to withstand potential seismic forces up to UBC Seismic Zone 4.

3.03 PADLOCKS:

A. Exterior switchboard shall be provided with padlocks keyed as directed by the Owner's Representative. Padlocks shall be supplied by the contractor.

3.04 FIELD TESTS:

A. Insulation resistance Tests: Perform insulation resistance tests on circuits to be energized with a line-to-neutral voltage of 120 volts or more. Make these tests after all equipment has been connected, except that equipment which may be damaged by the test voltage shall not be connected. Test the insulation with 500V dc insulation resistance tester with a scale reading 100 megohms. The insulation resistance shall be 2 megohm or more. Submit results for review.

B. Grounding: Grounding shall conform to Section 26 05 26.

C. Continuity: Switchboard circuits shall be tested for continuity prior to energizing. continuity tests shall be conducted using a dc device with a bell or buzzer.

END OF SECTION 26 05 26

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SECTION 26 24 16

PANELBOARDS AND DISTRIBUTION PANELS

PART 1 – GENERAL

1.01 DESCRIPTION OF WORK:

A. The work of this Section consists of providing panelboards and circuit breakers as shown on the Drawings and as described herein.

1.02 RELATED WORK:

A. See the following specification sections for work related to the work in this Section.

1. 260519 Line Voltage Wire and Cable
2. 260526 Grounding
3. 262816 Circuit Breakers

1.03 SUBMITTALS:

A. Shop Drawings - As specified in Division 01 and Section 26 05 00. For each panelboard and distribution panel furnished under this Contract, submit manufacturer's name, catalog data, and the following information:

1. Panelboard / distribution panel type.
2. Main bus and terminal connection sizes.
3. Location of line connections.
4. Cabinet dimension.
5. Gutter space.
6. Gauge of boxes and fronts.
7. Finish data.
8. Voltage rating.
9. Breaker manufacturer, types, trip rating, and interrupting ratings.
10. When information is available on the Drawings, show breaker circuit numbers and locations along with trip ratings on a panelboard layout.

B. Single Submittal - A single complete submittal is required for all products covered by this Section.

C. Closeout Submittals: Submit operation and maintenance data for panelboards and circuit breakers including nameplate data, parts lists, factory and field test reports, recommended maintenance procedures and typewritten as-built panel schedules. Submit in accordance with Division 01.

PART 2 – PRODUCTS

2.01 PANELBOARDS:

A. General: Lighting and Receptacle Panelboards shall be the automatic circuit breaker type. The number and arrangement of circuits, trip ratings, spares and blank spaces for future circuit breakers shall be as shown on the Drawings or, if not shown, 42 circuits. All circuit breakers shall be quick-make, quick-break, thermal-magnetic, bolt-on type (unless otherwise noted on drawings), with 1, 2 or 3 poles a shown, each with a single operating handle. Tandem or piggy-back breakers shall not be used.

B. Nameplates:

1. Each panelboard shall have a field mounted identifying, rigid, plastic nameplate giving the panel identification as shown on the Drawings.

2. Each panelboard shall have a manufacturer's nameplate showing the voltage, bus rating, number of phases, frequency and number of wires.

C. Construction:

1. Door and trim shall be finished to match finish type and color of surrounding wall. Box shall be hot-dip galvanized, and field finished to match the front.

2. Panelboards and enclosures shall conform to requirements of all relevant codes. Panelboards shall be suitable for use as service equipment.

3. Panelboards shall be furnished with hinged trim fronts with key latch and a typed directory card and holder. Panelboard circuits shall be arranged with odd numbers on the left and even numbers on the right. Provide weatherproof, NEMA type 3R enclosures for outdoor installation.

D. Busbars: Panelboard busbars shall be phase sequence type suitable for bolt-on circuit breakers. All busbars shall be copper.

E. Circuit Breakers: Circuit breakers shall be the molded case type with trip and interrupting ratings as shown on the Drawings.

F. Manufacturer:

1. Panelboard manufacturer shall be Square D, Siemens, [I.E.M], [General Electric], [or] [Eaton Cutler Hammer]. Panelboards shall be of the same manufacturer as the switchboard.

2.02 DISTRIBUTION PANELS:

A. General: Distribution panels shall be the automatic circuit breaker type. The number and arrangement of circuits, trip ratings, spares and blank spaces for future circuit breakers shall be as shown on the Drawings. All circuit breakers shall be quick-make, quick-break, thermal-magnetic bolt-on type, with 1, 2 or 3 poles a shown, each with a single operating handle. Tandem or piggy-back breakers shall not be used.

B. Nameplates:

1. Each distribution panel shall have a field mounted, identifying, rigid, plastic nameplate giving the panel identification as shown on the Drawings.

2. Each distribution panel shall have a manufacturer's nameplate showing the voltage, bus rating, number of phases, frequency and number of wires.

C. Construction:

1. Door and trim shall be finished to match color of surrounding wall. Box shall be hot-dip galvanized, field finished to match the front.

2. Distribution panels and enclosures shall conform to requirements of all relevant codes. Distribution panels shall be suitable for use as service.

3. Distribution panels shall have a front door with key latch and a typed directory card and permanently attached holder. Adhesive backed holders are not acceptable. Distribution panels circuits shall be arranged with odd numbers on the left and even numbers on the right. Provide weatherproof, NEMA type 3R enclosures for outdoor installation.

D. Busbars: Distribution panels busbars shall be phase sequence type suitable for bolt-on circuit breakers. All busbars shall be copper, sized for a maximum current density of 1000A psi.

E. Circuit Breakers:

1. Circuit breakers shall be the molded case type with trip and interrupting ratings as shown on the Drawings.

2. Circuit breakers equipped with Ground-Fault Equipment Protection shall be capable of the following types of ground-fault protection: residual, source ground return, and modified differential.

a. Ground-fault settings for circuit breaker sensor sizes 1200 A or below shall be adjustable from 0.2 to 1.0 times in in 0.1 In increments. The ground-fault settings for circuit breakers above 1200 A shall be adjustable from 500 to 1200 A.

3. Circuit breakers with an arc Energy-Reducing Maintenance Switch (ERMS) setting shall be equipped with a separate trip curve to reduce incident energy.

a. The ERMS trip curve shall be selected through physical selector. Trip unit [remote indicator light] shall indicate when trip unit is operating in ERMS mode.

b. Trip unit shall operate in Fast Instantaneous trip mode, 25 to 30 mS, when ERMS trip curve is active.

c. Engaging/disengaging the ERMS mode or making settings changes to the ERMS settings shall be restricted to authorized personnel by limiting access to such features by padlocks or passwords to ensure safety of the personnel working with the equipment.

F. Manufacturer:

4. Distribution panel manufacturer shall be Square D, Siemens, [I.E.M], [General Electric], [or] [Eaton Cutler Hammer]. [Distribution panels shall be of the same manufacturer as the switchboard.]

PART 3 – EXECUTION

3.01 **INSTALLATION:** Panelboards and Distribution Panels shall be installed where indicated on the Drawings, and in accordance with the manufacturer's instructions.

3.02 INSTALLATION:

A. Panelboards and Distribution Panels shall be installed where indicated on the Drawings, and in accordance with the manufacturer's instructions.

B. Circuit breakers for solidly grounded Wye Electrical Systems of more than 150V to Ground and 1000A or larger shall be equipped with Ground-Fault Equipment Protection.

C. Circuit breakers 1200A and larger shall be equipped with a separate trip curve for an arc Energy-Reducing Maintenance Switch (ERMS) setting to reduce incident energy.

3.03 MOUNTING:

D. Panelboards and Distribution Panels shall be mounted with the top of the box 6'-6" above the floor. Panelboards and Distribution Panels shall be plumb within 1/8-inch. The highest breaker operating handle shall not be higher than 72 inches above the floor.

3.04 FIELD TESTS:

A. Insulation Resistance Tests: Perform insulation resistance tests on circuits with #2 AWG and larger conductors to be energized with a line-to-neutral voltage of 120 volts or more. Make these tests after all equipment has been connected, except that equipment which may be damaged by the test voltage shall not be connected. Test the insulation with a 500Vdc insulation resistance tester with a scale reading 100 megohms. The insulation resistance shall be 2 megohms or more. Submit results for review.

B. Grounding: Grounding shall conform to Section 26 05 26.

C. Continuity: Panelboard and Distribution Panel circuits shall be tested for continuity prior to energizing. Continuity tests shall be conducted using a dc device with a bell or buzzer.

END OF SECTION 262416

SECTION 26 27 26

DEVICES WIRING

PART 1 – GENERAL

1.01 DESCRIPTION OF WORK

A. The work of this section consists of:

1. Furnishing, installing, and connecting all duplex receptacles complete with wall plates and/or covers, as shown on the Drawings.

2. Furnishing, installing and connecting all light switches complete with wall plates and or handle operators, as shown on the Drawings.

1.02 RELATED WORK:

A. See the following specification sections for work related to the work of this section:

1. 26 05 42 Conduits, Raceways and Fittings.

2. 26 05 19 Line Voltage Wire and Cable.

3. 26 05 33 Junction and Pull Boxes.

1.03 **SUBMITTALS**: As specified in Section 26 05 00 and Division 01.

A. Submit manufacturers published descriptive literature properly marked to identify the items to be supplied.

B. A single complete submittal is required for all products covered by this Section.

PART 2 – PRODUCTS

2.01 RECEPTACLES:

A. General - Receptacles shall be heavy duty, high abuse, grounding type.

B. [Tamper Resistant] Duplex Receptacles:

1. Receptacles shall be specification grade, rated 20 ampere, two-pole, 3-wire, 125 volt, NEMA 5-20 configuration, self-grounding with screw terminals. Color shall be as selected by the Architect.

2. Devices shall have a nylon face, back and side wired.

3. Manufacturer: Hubbell #DR20 Series [Hubbell #DR20_ _ TR], Leviton #16352 Series [Leviton # 16352-TRE _ _ Series].

C. GFCI Receptacles [Tamper Resistant]:

1. Device shall be rated 20 ampere, 2-pole, 3-wire, 120 volts, conforming to NEMA 5-20 configuration. Face shall be nylon composition. Unit shall have an LED type red indicator light, test and reset push buttons. Color shall be as selected by the Architect.

2. GFCI component shall meet UL 943 Class A standards with a tripping time of 1/40 second at 5 milliamperes current unbalance. Operating range shall extend from -31°F to 158°F. Unit shall have transient voltage protection and shall be ceramic encapsulated for protection against moisture.

3. Manufacturer: Hubbell #GF20_ _LA Series [Hubbell # GFTR20 _ _ Series], Leviton #GFNT2 Series [Leviton #GFTR2 Series].

D. Automatically Controlled Receptacles [Tamper Resistant]

1. Receptacles shall be specification grade, rated 20 amperes, two pole, 3-wire, 125V, NEMA 5-20 configuration, self-grounding with screw terminals. Color shall be selected by the Architect.

2. Devices shall have a nylon face, back and side wired. Marking permanently printed, molded, or stamped on the face of the receptacle and in compliance with controlled receptacle marking requirements stated in California Building Energy Efficiency Standards Section 130.5(d)(3).

3. Manufacturer: Pass & Seymour 26352CD (Dual Controlled Receptacle), 26352CH (Half Controlled Receptacle) [TR26352CD (Tamper Dual Controlled Receptacle), TR26352CH (Tamper Half Switched Receptacles); Leviton 16352-1 (Half Controlled Receptacle), Leviton 16352-2 (Dual Controlled Receptacle).

E. Weather Resistant GFCI Receptacles:

1. Device shall be rated 20 ampere, 2-pole, 3-wire, 120 volts, conforming to NEMA 5-20 configuration, Face shall be nylon composition. Unit shall have a LED type red indicator light, test and reset push buttons. Color shall be as selected by the architect.

2. GFCI component shall meet UL 943 Class A standards with a tripping time of 1/40 second at 5 milliamperes current unbalance. Operating range shall extend from -31°F to 158°F. Unit shall have transient voltage protection and shall be ceramic encapsulated for protection against moisture.

3. Manufacturer: Hubbell #GFTR20 _ _ Series, Leviton #GFWR2 Series.

F. Surge Suppression Receptacles:

1. Device shall be rated 20 ampere, 2-pole, 3-wire, 120 volt. Face shall be nylon composition. Unit shall have an LED type "Power-on" indication light and damage-alert audible alarm. Color shall be as selected by the Architect.

2. Surge suppression protection shall be listed to UL standard 1449 and shall instantly absorb a transient surge of 6,000 volts minimum. A minimum of four (4) Metal Oxide Varistors shall be utilized to absorb transients.

3. Manufacturer: Hubbell #HBL8362S Series, Leviton #8380 Series.

2.02 SWITCHES:

A. Switches shall be rated 20 amperes to 120/277 volts ac. Units shall be flush mounted, self-grounding, quiet operating rocker devices. Rocker color shall be as selected by the Architect.

1. Manufacturer: Hubbell #DS_20_ _ Series, Leviton #5621 Series. See plans for single pole, three way and four-way requirements.

B. Timed switches: Shall be as designed by Paragon Electric Company # ET2000f or Watt Stopper TS-400 rated for the voltage specified on drawings. Time-out shall be adjustable from 5 minutes up to 12 hours. Unit shall be provided with warning alarm.

C. Dimmer switches: Switch shall be a specified-on drawings, color per architect. Heat fins shall not be removed, where dimmer switches are ganged together, care shall be taken to install correct size backbox to accommodate switches without removing fins.

2.03 PLATES:

A. General - Plates shall be of the style and color to match the wiring devices, and of the required number of gangs. Plates shall conform with NEMA WD 1, UL 514 and FS W-P-455A. Plates on finished walls shall be non-metallic or stainless steel. Plates on unfinished walls and on fittings shall be of zinc plated steel or case metal and shall have rounded corners and beveled edges.

B. Non-Metallic: Plates shall be plain with beveled edges and shall be nylon or reinforced fiberglass.

C. Stainless Steel: Plates shall be .040 inches thick with beveled edges and shall be manufactured from No. 430 alloy having a brushed or satin finish.

D. Cast Metal: Plates shall be cast or malleable iron covers with gaskets so as to be moisture resistant or weatherproof.

E. Blank Plates: Cover plates for future telephone outlets shall match adjacent device wall plates in appearance and construction.

F. Weatherproof Plate: Cover plates in wet and damp locations shall have recessed in-use covers, Taymac or equal. Back box shall be suitable for the wall material where it is installed.

G. Labeling: All switch and receptacle plates shall be labeled on the top portion of the plate with the panelboard and circuit number serving that device. Lettering shall be 3/16” minimum high, black color, on clear Mylar 3/8” tape. Manufactured by P-touch or equal.

PART 3 – EXECUTION

3.01 INSTALLATION OF WIRING DEVICES:

A. Interior Locations: In finished walls, install each device in a flush mounted box with washers as required to bring the device mounting strap level with the surface of the finished wall. On unfinished walls, surface mount boxes level and plumb.

B. Mounting Heights: Adjust boxes so that the front edge of the box shall not be farther back from the finished wall plane than 1/4-inch. Adjust boxes so that they do not project beyond the finished wall. Height of device shall be as follows unless otherwise noted on the drawings:

1. Receptacles 15 Inches from finished floor to bottom of box.

2. Toggle Switches 48 Inches from finished floor to top of box.

C. Receptacles:

1. Ground each receptacle using a grounding conductor, not a yoke or screw contact.

2. Install receptacles with connections spliced to the branch circuit wiring in such a way that removal of the receptacle will not disrupt neutral continuity and branch circuit power will not be lost to other receptacles in the same circuit.

3.02 INSTALLATION OF WALL PLATES:

A. General - Plates shall match the style of the device and shall be plumb within 1/16-inch of the vertical or horizontal.

B. Interior Locations, Finished Walls: Install non-metallic plates so that all four edges are in continuous contact with the finished wall surfaces. Plaster filling will not be permitted. Do not use oversized plates or sectional plates.

C. Interior (not wet) Locations, Unfinished Walls: Install stainless steel or cast metal cover plates.

D. Wet Locations: Install cast metal plates with gaskets on wiring devices in such a manner as to provide a rain tight weatherproof installation. Cover shall be [lockable] outdoor “in use” type.

E. Future Locations: Install blanking cover plates on all unused outlets.

3.03 TESTS:

A. Receptacles:

1. After installation of receptacles, energize circuits and test each receptacle to detect lack of ground continuity, reversed polarity, and open neutral condition.

END OF SECTION 26 27 26

SECTION 26 28 16

CIRCUIT BREAKERS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK:

A. The work of this Section consists of providing circuit breakers as shown on the Drawings and as described herein.

1.02 **RELATED WORK**: See the following Specification Sections for work related to the work in this Section.

A. 26 05 00 General Electrical Requirements

B. 26 24 13 Switchboards

C. 26 24 16 Panelboards and Distribution Panels

1.03 SUBMITTALS:

A. Shop Drawings - Submittals shall be in accordance with Section 260500 and Division 01. For each circuit breaker furnished under this Contract, submit manufacturer's name, catalog data, and the following information:

1. Terminal connection sizes.

2. Voltage rating.

3. Breaker manufacturer, types, trip ratings and interrupting ratings.

B. Single Submittal - A single complete submittal is required for all products covered by this Section.

C. Closeout Submittals: Submit in accordance with and Section 260500, operation and maintenance data for circuit breakers including nameplate data, parts lists, manufacturer's circuit breaker timer, current, coordination curves, factory and field test reports and recommended maintenance procedures.

PART 2 - PRODUCTS

2.01 **CIRCUIT BREAKER:** Each circuit breaker shall consist of the following:

A. A molded case breaker with an over center toggle-type mechanism, providing quick-make, quick-break action. Each circuit breaker shall have a permanent trip unit containing individual thermal and magnetic trip elements in each pole. Multipole circuit breakers shall have variable magnetic trip elements which are set by a single adjustment to assure uniform tripping characteristics in each pole. Circuit breakers shall be of the bolt-on type unless otherwise noted.

B. Breaker shall be calibrated for operation in an ambient temperature of 40°C.

C. Each circuit breaker shall have trip indication by handle position and shall be trip-free.

D. Three pole breakers shall be common trip.

E. The circuit breakers shall be constructed to accommodate the supply connection at either end of the circuit breaker. Circuit breaker shall be suitable for mounting and operation in any position.

F. Breakers shall be rated as shown on Drawings.

G. Circuit breaker and/or Fuse/circuit breaker combinations for series connected interrupting ratings shall be listed by UL as recognized component combinations for use in the end use equipment in which it is installed. Any series rated combination used shall be marked on the end use equipment per CEC section 110-22.

H. Breakers shall be UL listed. Circuit breakers shall have removable lugs.

I. Lugs shall be UL listed for copper and aluminum conductors.

J. Breakers shall be UL listed for installation of mechanical screw type lugs.

K. Circuit breakers serving HACR rated loads shall be HACR type. Circuit breakers serving other motor loads shall be motor rated.

PART 3 - EXECUTION

3.01 MOUNTING:

A. The highest breaker operating handle shall not be higher than 72 inches above the floor.

END OF SECTION 26 28 16

SECTION 26 51 00

LIGHTING

PART 1 – GENERAL

1.01 DESCRIPTION OF WORK:

A. The work of this section consists of providing and installing a complete lighting system, including fixtures, LED light module, [ballasts], [sockets], [lamps], hangers, reflectors, glassware, lenses, auxiliary equipment, heat management components, LED driver (integral or remote), and housing.

1.02 RELATED WORK:

A. See the following specification sections for work related to the work of this section:

1. 26 05 00 General Electrical Requirements.

2. 26 05 42 Conduit, Raceway and Fittings.

3. 26 05 19 Line Voltage Wire and Cable.

4. 26 05 33 Junction and Pull Boxes.

1.03 **SUBMITTALS:** In accordance with Division 01.

A. Submit descriptive data, photometric curves for each fixture configuration proposed.

B. Submit shop drawings showing proposed methods for mounting lighting fixtures.

C. Seismic Requirements: Submit:

1. Sketch or description of the anchorage system if not provided on construction documents.

D. Submit Operation and Maintenance Data per Division 01.

1.04 WARRANTY:

A. LED light module, LED driver, [HID and Fluorescent lamps], [ballasts], batteries or other luminaire components which fail within the first year after final acceptance shall be replaced by the Contractor with the warranty clause of the General Provisions.

B. Replacement components provided under warranty to be provided by contractor, not taken from project spare stock.

PART 2 – PRODUCTS

2.1 GENERAL

A. Fixtures shall be of the types, wattages and voltages shown on the Drawings and be UL or equivalent classified and labeled for the intended use.

B. Substitutions will not be considered unless the photometric distribution curve indicates the proposed fixture is equal to or exceeds the specified luminaire and the substitution is consistent with the design intent.

C. Luminaire (factory or field installed) wire, and the current carrying capacity thereof shall be in accordance with the CEC.

D. Luminaires and lighting equipment shall be delivered to the project site complete, with suspension accessories, aircraft cable, stems, hangers' canopies, hickeys, castings, sockets, holders, LED light engine, [lamps], [ballasts], diffusers, frames, and related items, including support and braces.

2.2 LIGHT EMITTING DIODE (LED) LIGHT SOURCES AND LUMINAIRES:

A. General (Non-Emergency):

1. Provide identical power supply and driver within each luminaire type. Provide power supplies and drivers that are suitable and UL-listed for the electrical characteristics of the supply circuits to which they are to be connected and which are suitable for operating LED or relevant light sources.
2. Unless otherwise specified, provide power supplies of same type and same manufacturer for ease of stocking and replacement.
3. Components shall be configured and installed in luminaire by the luminaire manufacturer.
4. Luminaire housing shall be constructed of painted metal with no sharp edges unless otherwise noted.
5. Provide only luminaires whose design, fabrication and assembly prevent overheating or cycling of light engines or drivers/power supplies under any condition of use.
6. Electronic ballasts shall meet the requirements of the Federal Communications Commission Rules and Regulations, Part 18, Part C (RF Lighting Devices) Non-consumer equipment, regarding radio frequency interference (RFI) (radiated) and electromagnetic interference (EMI) (power line conducted).
7. Submit light fixture details with luminaire shop drawings.

B. Emergency Lighting: Battery-backed emergency lighting luminaires shall consist of a normal LED luminaire with some or all of the LEDs connected to a battery and charger.

1. The battery shall be nickel cadmium and sized for a minimum of 90 minutes of luminaire operation unless otherwise noted.
2. The charger shall be solid-state and include overload, short circuit, brownout and low battery voltage protection.
3. The battery and charger shall include self-diagnostic and self-exercising circuitry to exercise and test itself for 5 minutes every month and for 30 minutes every 6 months.
4. The luminaire shall include a test/monitor module with status indicating lights mounted so as to be visible to the public.
5. The luminaire shall not contain an audible alarm.
6. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.

C: LED Performance and component manufacturer requirements.

1. All color characteristics, SPD (Special Power Distribution) CCT, CRI, CIE Chromaticity Coordinates shall be consistent across the entire dimming range.

2. LEDs shall comply with ANSI/NEMA/ANSLG C78.377-2008 – Specifications for the Chromaticity of Solid-State Lighting Products. Color shall remain stable throughout the life of the source. The chromaticity of the installed product shall match IES LM-80 data showing that the LED's do not shift more than .005 DuV from submitted documentation.

3. White LEDs shall have a minimum rated source life of 50,000 hours or as specified: Luminaire Schedule. Multicolor LEDs shall have a minimum rated source life of 100,000 hours. LED "rated source life" shall be determined per IES TM-21 - Projecting Long Term Lumen Maintenance of LED Light Sources based on LM-80 test data. Calculated lifetimes exceeding testing hours per TM-21 are not accepted.

4. Luminaire assembly shall include a method of dissipating heat so as to not degrade life of source, electronic equipment, or lenses. LED luminaire housing shall be designed to transfer heat from the LED board to the outside environment. Luminaire housing shall have no negative impact on life of components. Manufacturer shall provide Luminaire Efficacy (lm/W), total luminous flux (lumens), luminous intensity (candelas), chromaticity coordinates, CCT, CRI, optical performance, polar diagrams, and relevant luminance and illuminance photometric data. Provide data in IES file format in accordance with testing standards IES LM-79-08 and IES LM-82-12, based on test results from an independent Nationally Recognized Testing Laboratory or National Voluntary Laboratory Accreditation Program (NVLAP) accredited laboratory.

5. Manufacturer will keep record of original chromaticity coordinates for each LED module and have replacement modules or luminaires from within three (3) MacAdamEllipses/ steps of the same coordinates available for the duration of the warranty period.

6. Manufacturer's LED light engine or equivalent system will be available for ten (10) years: Manufacturer will provide exact replacement parts, complete replacement luminaires, or provide upgraded parts that are designed to fit into the original luminaire and provide equivalent distribution and lumen output to the original, without any negative consequences.

7. All LED sources used in the LED luminaire shall be of proven quality from established and reputable LED manufacturers and shall have been fabricated within 12 months before installation per the date code on the module. Acceptable LED component or module manufacturers unless otherwise noted are:

    a. Cree, Inc.

    b. Lumileds

    c. Nichia Corporation

    d. Norlux

    e. Lextar

    f. Osram Optronic Semiconductors

g. Xicato

h. Bridgelux

i. Epistar

j. San'an

k. Citizen Electronics

l. General Electric Company

m. Soraa

n. Samsung

o. Seoul Semiconductor

p. Lumenetix

q. Ledengin

2.3 LED POWER SUPPLIES/ DRIVERS:

1. LED driver shall have a minimum 50,000 hour published life while operating at maximum case temperature and 90 percent non-condensing relative humidity.
2. Driver shall be Sound Rated A+.
3. Driver shall be > 80% efficient at full load across all input voltages.
4. Driver shall include ability to turn off at low control input rather than holding at a minimum dimming level, and shall consume 0.5 Watts or less in standby/off mode. Control dead band at low control input shall be included to allow for voltage variation of incoming signal without causing noticeable variation in luminaire to luminaire output.
5. Drivers shall track evenly across multiple luminaires at all light levels, and shall have an input signal to output light level that allows smooth adjustment over the entire dimming range.
6. Control Input:
   a. 4-Wire (0-10V DC Voltage Controlled) Dimming Drivers
      (i) Must meet IEC 60929 Annex E for General White Lighting LED drivers.
      (ii) Connect to devices compatible with 0 to 10V Analog Control Protocol, Class 2, capable of sinking 0.6 ma per driver at a low end of 0.3V.
      (iii) Must meet ESTA E1.3 for RGBW LED drivers.
   b. Digital (DALI Low Voltage Controlled) Dimming Drivers
      (i) Must meet IEC 62386.
   c. Digital Multiplex (DMX Love Voltage Controlled) Dimming Drivers

(i) Must meet DMX / RDM: USITT DMX512A and ANSI E1.20 (Explore & Address).

(ii) Must be capable of signal interpolation and smoothing of color and intensity transitions.

7. Power Factor: The luminaire shall have a power factor of 90% or greater at all standard operating voltages and full luminaire output.
8. THD: Total harmonic distortion (current and voltage) induced into an AC power line by luminaire shall not exceed 10 percent at any standard input voltage and meet ANSI C82.11 maximum allowable THD requirements at full output. THD shall at no point in the dimming curve allow imbalance current to exceed full output THD.
9. In Rush Current: Meet or exceed NEMA 410 driver inrush standard of 430 Amps per 10 Amps load with a maximum of 370 Amps 2 – seconds.
10. RF Interference: The luminaire and associated on-board circuitry must meet Class A emissions limits referred in Federal Communications Commission (FCC) Title 47, Subpart B, Section 15 Non-Consumer requirements for EMI/RFI emissions.
11. Light engines shall be [2700] [3000] [3500] [4000] °K [80] [90] CRI minimum, U.O.N. on drawings.
12. Drivers [and ballasts] shall be accessible for maintenance or replacement without removal of recessed light fixture and without destruction of the ceiling.

2.4 FLUORESCENT LIGHT SOURCES AND LUMINAIRES:

A. General Fluorescent Ballasts:

1. Ballasts shall be of the types shown on the drawings. Ballasts shall be CBM certified and bear the UL label. Magnetic ballasts shall be the high-power factor type. Electronic ballasts shall be suitable for lamps specified by Advance, Magnetek/Universal, Motorola or approved equal. Electronic ballast shall be CBM certified and have a 10% maximum total harmonic distortion.

2. All ballasts for fixtures installed outdoors shall provide reliable starting of lamps at 0°F at 90% of the nominal line voltage.

3. Ballasts producing excessive noise (above 36 dB) or vibration will be rejected and shall be replaced at no expense to the Owner.

B. Fluorescent Lamps:

1. Lamps shall be new at the time of acceptance and shall be General Electric, Osram /Sylvania, Phillips, or approved equal.

2. Unless otherwise noted on the drawings, lamps shall be third generation T8, [2700] [3500] [4100] °K, and 85 CRI minimum.

3. Third Generation: Also known as High-Performance, Higher Lumen, or Super, the third generation of 32-Watt T8 lamps offers 3,100 lumens and a long-life rating of 24,000 hours. Efficacy is high, with lumens per watt in the range of 94 to 100. CRI is 82 to 86.

PART 3 – EXECUTION

3.01 INSTALLATION:

A. General:

1. All fixtures and luminaires shall be clean and lamps shall be operable at the time of acceptance.

2. Install luminaires in accordance with manufacturer's instructions, complete with lamps, ready for operation as indicated.

3. Align, mount, and level the luminaires uniformly.

4. Avoid interference with and provide clearance for equipment. Where an indicated position conflicts with equipment locations, change the location of the luminaire by the minimum distance necessary.

5. Recessed light fixtures in fire rated assemblies shall be installed per an approved UL rated fire rated pentation detail.

B. Mounting and Supports:

1. Mounting heights shall be as shown on the Architectural and Electrical Drawings. Unless otherwise shown, mounting height shall be measured to the centerline of the outlet box for wall mounted fixtures and to the bottom of the fixture for suspended fixtures and to the bottom of the fixture for all other types.

2. Luminaire supports shall be anchored to structural members.

3. Pendant stem mounted luminaires shall be provided with ball aligners to assure a plumb installation and shall have a minimum 45-degree clean swing from horizontal in all directions. Sway bracing shall be installed as required to limit the movement of the fixture. Fixtures shall be allowed to sway a maximum of 45º without striking any object.

4. Fixture supports shall be designed to resist earthquake forces of seismic zone 4.

5. Refer to fixture mounting details on drawings for installation requirements.

6. Pendant cable mounted luminaries shall be provided with fully adjustable stainless-steel aircraft cable hangers unless otherwise noted on the Drawings.

END OF SECTION 26 51 00

SECTION 26 51 10

OCCUPANCY SENSORS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK:

A. Work included: Furnish all material to install a complete working lighting control system that activates the rooms lighting only when the presence of a Human Body is detected. The work includes but is not limited to the following:

1. Motion Detectors.
2. Control units/ Relays.
3. Line and Low Voltage Wiring.
4. Accessories such as Conduit, Fittings, Mounting Brackets, Junction Boxes, Etc.

1.02 RELATED WORK:

A. See the following Specification Sections for work related to this Section.

1. 26 05 00 General Electrical Requirements.
2. 26 05 19 Line Voltage Wire and Cable.
3. 26 05 33 Junction and Pull Boxes.
4. 26 51 00 Lighting.

1.03 SUBMITTALS:

A. Product Data: Provide catalog cuts of all type of occupancy sensors.

1.04 QUALITY ASSURANCE:

A. In addition to the requirements in these specifications, comply fully with the manufacturer's detailed installation instruction sheets included with each component.

PART 2 - PRODUCTS

2.01 MANUFACTURER:

A. The Manufacturer of the lighting control system specified herein shall be Leviton or Watt Stopper. Other Manufacturers may be considered equal if they meet the performance requirements of this specification and have received prior written approval.

2.02 OPERATIONS:

A. The optical system shall be a multi-segment or fresnel lens, creating a series of passive infrared or Ultrasonic beams. Multiple rows of beams shall be used to sense multiple distances within

the viewing area. The dimensional size of each lens segment in each respective row shall increase in size from the center of the lens to the edges of the lens to create uniform beam strength throughout the field-of- view.

B. Upon detection of human activity by the detector, a Time Delay shall be initiated to maintain the lights on for a pre-set period of time. The time delay setting shall be field adjustable from 30 seconds to 20 minutes.

C. The sensor or sensor system shall provide override capabilities to turn off or on the lights manually. A field adjustable lock-out feature shall be provided to prevent occupants from overriding the sensor or sensor system On, Off, or both.

D. System installations shall be warranted by the installing contractor and manufacturer for one year.

E. All Line Voltage Sensors, Control Units, and Relays shall be U.L. listed under Section 508 Industrial Control Equipment.

2.03 MATERIALS:

A. Sensors shall be provided by one manufacturer and shall be sized to provide full coverage of the space:

1. Leviton OD series or

2. Watt Stopper # W-2000

B. Power Pack:

1. Leviton ODP20 or

2. Watt Stopper # A120-E or A277-D

PART 3 - EXECUTION

3.01 INSTALLATION:

A. The contractor shall install a complete and working system to control the lighting in the area noted on the drawings. The Contractor shall insure that at completion of work that the system is properly working and all sensitivities have been properly adjusted.

END OF SECTION 26 51 10

MONTEREY COUNTY TELECOMMUNICATIONS CABLING AND PATHWAY SYSTEMS

PART 1-GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division-1 Specifications Sections, apply to Work of this Section.

B. The general conditions for contracts of construction, referred to in the contract documents as the General Conditions, together with the following articles of the Telecommunications Cable and Pathways Specification, that amend, modify and supplement various articles and provisions of the General Conditions, are made part of the Contract and shall apply to all work under the Contract.

C. All articles or parts of articles of the General Conditions not so amended, modified or supplemented by this Telecommunications Cabling Specification shall remain in full force and effect. Should any discrepancy become apparent between the General Conditions and the Telecommunications Cable and Pathways Specification, the Contractor shall notify the Architect, in writing, and the Architect shall interpret and decide such matters in accordance with the provisions of the General Conditions.

1.02 SPECIAL CONDITIONS

A. Standards, materials specifications, related drawings, cable schedules, industry guidelines, and codes referred to herein shall be considered part of these specifications and shall apply to the Work described or implied, herein.

B. All local fees, permits and services of inspection authorities shall be obtained and paid for by the Contractor, The Contractor shall cooperate fully with local utility companies with respect to their services.

C. It is the intent of these specifications for the Contractor to provide a complete, functional, standards-based cabling infrastructure for the County's use, utilizing Category 6 and Category 6A cabling to support high speed data applications up to and in excess of 1000 Mb/s horizontally and 10 Gigabit Ethernet in the wireless and backbone network systems.

D. Any item not specifically shown on the drawings or called for in the specifications, but normally required to conform to the system design intent as presented, is to be considered as part of the Contract and required to be furnished and installed by the Contractor.

E. Any given item of equipment or material shall be the product of one manufacturer solution throughout the facility. Multiple manufacturers of any one item will not be permitted, unless specifically noted otherwise or approved in writing by the Designer prior to purchase and use.

F. This specification is an equipment and performance specification. Actual installation shall be as indicated on the Telecommunications Drawings and in the Specifications governing the Work. Any discrepancies found between the Specifications and the Drawings shall be immediately brought to the attention of the Architect for interpretation.

G. Contract Documents and Drawings depict equipment installation and wiring in a diagrammatic fashion and indicate the general arrangement of equipment and wiring. The most direct routing for conduits and telecommunications pathways is not assured. Exact requirements shall be governed by architectural, structural and mechanical condition/features of the job. Consult all other drawings and specifications.

1.03 PRICING

A. Provide total cost and unit pricing as per the General Conditions and Bid instructions.

1.04 CONTRACTOR EXPERIENCE

A. The selected Contractor shall be fully capable and experienced in the telecommunications distribution system specified. To ensure the system has continued support, the County will contract only with Contractors having a successful history of sales, installation, service, and support.

B. During the bid evaluation process, the Customer may, with full cooperation of the Contractor, visit the Contractor's places of business, observe operations, and inspect records. The Contractor must have a minimum of five (5) years of continuous experience in the network cabling installation field and possess a C7 or C10 license in the State of California.

C. Contractor must be an approved Leviton Certified Installer in the Leviton Certified Network Installer program before, during, and through completion of the

system installation. Supporting documentation will be required as part of the submittal.

D. The Contractor must have a Registered Communications Distribution Designer (RCDD) on staff that will be ultimately responsible for this project in the Project Manager role. The RCDD must have sufficient experience in this type project as to be able to lend adequate technical support to the field forces during installation, during the warranty period, and during any extended warranty periods or maintenance contracts. A resume of the responsible RCDD must be attached to the Contractor's response for evaluation by the County. Should the RCDD assigned to this project change during the installation, the new RCDD assigned must also submit a resume for review by the County. If, in the opinion of the County, the RCDD does not possess adequate qualifications to support the project, the County reserves the right to require the Contractor to assign an RCDD who, in the County's opinion, possesses the necessary skills and experience required of this project.

1.05 WORK INCLUDED

A. The work covered by this Contract includes the construction described and implied, all labor required to perform and complete such construction, all materials required to perform and complete such construction, all services, facilities, tools and equipment required to perform and complete such construction, and coordination with the General Contractor and all other trades.

B. The scope of this work includes, but is not limited to:

1. Provision, installation, termination, identification, and testing of optical fiber backbone cables and high pair count UTP copper cables between the Equipment Rooms (ERs) and all Telecom Rooms (TRs).
2. Provision, installation, termination, identification, and testing of inside plant UTP workstation cables between the TRs/ERs and the workstations located in the building. This includes all termination components to complete the horizontal links to each workstation outlet.
3. Provision, installation and grounding of all telecommunications racks, cabinets, cables (as required), and all cable pathways requiring grounding under TIA standards and BICSI guidelines.
4. Provision of labeling and documentation of all cables, racks, grounding buss-bars, pathways and spaces, faceplates, patch panels and termination blocks installed under this Work.
5. Provision and installation of wire management components, ladder-type cable runway, any surface-mount raceways and miscellaneous "nuts & bolts" type components to provide a complete and working cable system.

6. Fire stopping of floor and rated wall penetrations specifically provided for the distribution of telecommunications cables. Required floor and wall ratings shall be maintained.
7. Preparation and submission of shop drawings, termination schedules, test results, as-built drawings, warranty application, and component documentations described within this Specification.

1.06 RELATED WORK NOT INCLUDED IN THIS SECTION AND SPECIFIED ELSEWHERE, UNLESS OTHERWISE NOTED

A. Installation of conduits, pull-boxes and floor-boxes (provided under electrical Work).

B. Installation of workstation devices, computers, terminals and similar equipment (installed by County representatives and their additional representatives).

C. Installation, provisioning or supply of active data and telephone switch equipment is not included in this scope of work.

D. Provision and installation of AC grade or better plywood on the ER and TRs walls, as indicated in the drawings. Plywood shall be at least ¾" thick and treated on all sides with at least two coats of fire-resistant paint, white color. Fire rated stamping should be kept visible but rest of board to be painted white color. Each board shall have it's own stamp.

1.07 SITE VISIT & FIELD CONDITIONS

A. Prior to submitting bids for the project, and where practicable, contractor shall visit the work site to become aware of any conditions that may affect the cost of the project.
B. For work performed on an existing structure, the Contractor shall visit and examine the site of the proposed work to determine the existing conditions that may affect the work. The Contractor shall be held responsible for any assumptions in regard thereto.
C. Contractor shall obtain a complete set of Project Drawings and Specifications for coordination and to determine the full scope of work.

D. The Contractor shall verify all dimensions and distances in the field and document the cable lengths and materials to be furnished and installed. The provision and installation of non-specified miscellaneous components and hardware, i.e. drag lines, nuts, bolts and tie wraps shall also be the Contractor's responsibility.

E. Existing site conditions, Contract Documents and the overall construction schedule must be carefully reviewed to determine all required interfacing and timing of the work. All such documents shall be available through the General

Contractor or Construction Management.

1.08 PERMITS

A. Contractor shall obtain all permits and required inspections for the installation of this work and pay all charges associated.
B. Deliver to the Owner all certificates, permits and inspection reports issued by authorities having jurisdiction (AHJ).

1.09 ADHERENCE, ABBREVIATIONS AND DEFINITIONS

A. The Work specified herein shall conform to the following codes, regulations, standards, and guidelines:

B. FCC:

1.	Part 15:	Unlicensed Radio Frequency Devices
2.	Part 68:	Terminal Equipment Certification Requirements

C. NEC 2017 or latest edition utilized by AHJ.

D. NESC 2008 or latest edition utilized by AHJ.

E. NFPA codes (latest edition utilized by AHJ).

F. State and Local Municipal Construction-Related Codes

G. Underwriters Laboratory (UL)

H. IEEE:

1.	IEEE 802.3:	10Base-T Ethernet Standard
2.	IEEE 802.12:	100Base-TX Ethernet Standard
3.	IEEE 802.3ab:	1000Base-T Ethernet Standard
4.	IEEE 802.3ae:	10Gb/s Ethernet Standard
5.	IEEE 802.3af:	Power Over Ethernet Standard
6.	IEEE 802.3at:	Power Over Ethernet (PoE+) Standard
7.	IEEE 802.3bt:	Power Over Ethernet (PoE+) Standard, Type 3 & 4
8.	IEEE 802.3ba:	40 and 100 Gigabit Ethernet Standard
9.	IEEE 802.11ac:	All Wireless Ethernet Standard(s)

I. BICSI:

1.	TDMM:	14th Edition or later
2.	ITSIMM:	7th Edition
3.	OSPDRM:	6th Edition
4.	ANSI/BICSI 007-2019:	Data Center Design and Implementation Best Practices
5.	ANSI/BICSI 007-2017:	ICT Design and for Intelligent Buildings and Premises
6.	ANSI/BICSI 008-2018:	WLAN Systems Design and Implementation Best Practices
7.	ANSI/BICSI N1-2019:	Installation of ICT Cabling to Support Remote Power
8.	ANSI/BICSI N3-20: Building	Bonding and Grounding of ICT Systems and Infrastructure Telecommunications Cabling

J. ANSI/TIA: (includes all related addenda to each standard)

1. TIA-310-D: Racks, Panels and Associated Equipment
2. TIA-455-13-A: Visual and Mechanical Inspection of Optical Fibers, Cables, Connectors and other Optical Devices.

3. TIA-455-57-B: Optical Fiber End Preparation and Examination.
4.
5. TIA-455-78-C: Measurement Methods and Test Procedures - Attenuation with an OTDR.
6. TIA-455-95-B: Absolute Optical Power Test for Optical Fibers and Cables.
7. TIA-4720000-A: Generic Specification for Fiber Optic Cable.
8. TIA.472C000-B: Standard for Optical Fiber Premises Distribution Cable.
9. TIA-492AAAD: Detail Specification for 850-nm Laser- Optimized, 50-µm Core Diameter/125-µm Cladding Diameter Class la Graded-Index Multimode Optical Fibers Suitable for Manufacturing OM4 Cabled Optical Fiber.
10. TIA-492CAAB: Specification for Class IVa Dispersion-Unshifted Single-Mode Optical Fibers with Low Water Peak.
11. TIA-526-7: Optical Power Loss Measurement of Installed Single Mode Fiber Cable Plant.
12. TIA-526-14: Optical Power Loss Measurements of Installed Mulitmode Fiber Cable Plant.
13. TIA-568.0-E: Generic Telecommunications Cabling for Customer Premises.
14. TIA-568.1-E: Commercial Building Telecommunications Cabling Standard.
15. TIA-568-2.D: Balanced Twisted-Pair Telecommunications Cabling and Components Standard.
16. TIA-568-3.D: Optical Fiber Cabling and Components Standard.
17. TIA-569-E: Telecommunications Pathways and Spaces
18. TIA-598-D: Optical Fiber Cable Color Coding.
19. TIA-606-C: Administration Standard for the Commercial Telecommunications Infrastructure
20. TIA-607-D: Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises
21. TIA-758-B: Customer-owned Outside-Plant Telecommunications Infrastructure Standard.
22. TIA-862-B-1 Structured Cabling Infrastructure Standard for Intelligent Building Systems
23. TIA-942-B Telecommunications Infrastructure Standard For Data Centers
24. TIA-1152-A Requirements for Field Test Instruments and
25. Measurements for Balanced Twisted Pair CablingTIA-5017 Telecommunications Physical Network Security Standard
26. TIA-5018 Distributed Antenna Systems (DAS)

27. TIA TSB-162-A — Telecommunications Cabling Guidelines for Wireless Access Points
28. TIA TSB-184-A — Power Delivery (4-pair)

K. ANSI/ICEA:

1. ICEA S-83-596: Indoor Optical Fiber Cable Technical Requirements. (2016)
2. ICEA S-90-661: Standard for Individually UTP Indoor Cables for Use in General Purpose and LAN Communication Wiring Systems Technical Requirements (2012).

L. The installation shall comply fully with all National, State, and Local government authorities, laws and ordinances, as well as, all regulations, codes, and industry guidelines governing the work or interpreted to govern the work by the authority having jurisdiction (AHJ) at the site. This includes all Owner-specific standards and guidelines related to the Work.

M. Should any change in the current plans or specifications be required to comply with any Code, Regulation or Standard noted above, the Contractor shall notify the Designer and Architect in writing at the time of submitting the construction schedule.

N. All equipment and installation methods shall be equal to or exceed the minimum requirements of NEMA, IEEE, ASME, ANSI, TIA BICSI, and Underwriters' Laboratories, where applicable.

O. CONFLICTS:
1. Drawings and specifications are to be used in conjunction with one another and to supplement one another. In general, the specifications determine the nature and quality of the materials and tests and give characteristics of performance that should be adhered to in the installation of the communications system components, the drawings establish the quantities and details of installation.
2. If there is an apparent conflict between the drawings and specifications, or between specification sections, the items with the greater quantity or quality shall be estimated and installed.
3. Clarification with the Owner and/or Owner's Representative about these items shall be made prior to ordering and installation of components.

1.10 SUBMITTALS

A. Provide submittals in accordance with schedule and general requirements defined in the General Conditions.

B. Product Data:

1. Provide, as part of the bid, manufacturers' product data sheets for all material and equipment whose products are proposed. Only specified or accepted manufacturers or suppliers shall appear in the Product Data Submittal. Bid

shall not be considered without a complete Product Data Submittal.

2. Approved suppliers of the structured cabling system are Berk-Tek and Leviton, or Leviton Network Solutions . Approved supplier of the support infrastructure components is Chatsworth Products.

3. Provide, as part of the bid, manufacturer's product data sheets for all fire stopping materials proposed for use on the project.

4. Mark each copy to show applicable choices and options. Where product data includes information on several products, some of which are not required, mark copies to indicate the applicable information.

5. Requests for substitutions of equipment or materials must be made and approved prior to the bid submittal. Unapproved substitutions may constitute a non-compliant bid return.

C. Shop Drawings:

1. Provide, for Architect's action, shop drawings for the installation of the Work prior to beginning Work

2. Provide detailed plan views and elevations of all equipment racks, termination blocks, patch panels and cable paths, if the elevation and plan views are not identical to the T-series bid drawings.

3. Provide drawings to show evidence of coordination with other trades.

4. Acceptance of any submitted data or Shop Drawings for material, equipment apparatus, devices, arrangement and layout shall not relieve Contractor from responsibility of furnishing same of proper dimensions and weight, capacities, sizes, quantity, quality and installation details to perform efficiently the requirements and intent of the Contract. Such acceptance shall not relieve Contractor from responsibility for errors, omissions or inadequacies of any sort on submitted data or Shop Drawing.

5. All Shop Drawings shall be submitted sufficiently in advance of field requirements to allow ample time for review and re-submittal as may be required. All Submittals shall be complete and contain all required and detailed information.

6. All Shop Drawings shall contain job name/title and reference to the applicable Drawing and Specification article for reference by the reviewer.

7. Provide for County's documentation, a Finish Statement in form stipulated by the Architects, signed by the Contractor, stating that the Work was provided in compliance with the Contract Documents and that the installation was proper for the conditions of application and use.

D. Record Drawings – Submit for County's representative's documentation:

1. Provide Record Drawings annotated with the changes made during the installation of the Work so as to be a complete set of "as installed" plans. Drawings shall be in printed form and on compact disk in AutoCAD 2014 or earlier DWG format.

2. Provide County representative with two (2) sets of Operation and Maintenance Manuals including wiring diagrams, parts lists, shop drawings and manufacturers' information on all equipment and cables provided under this Work. Provide manuals in a high quality, 3-ring binder, completely indexed. Provide manuals to the County representative not more than 1 week after project completion.

1.10 QUALITY ASSURANCE

A. Contractor is solely responsible for quality control of the Work. Comply with any Quality Control requirements specified in the General Conditions.

B. All materials furnished shall be new and unused. All materials shall meet all applicable codes provided a standard has been established for the material in question.

C. At a minimum, fifty percent (50%) of Contractor-provided field technicians at any time shall be factory-certified within 12 months by the manufacturer of the telecommunications system components to install the Contractor-selected and Owner-approved system components. Proof of certification shall be available on site for review at all times for each field technician.

D. Contractor shall be in good standing with the selected manufacturer(s) of system components and be able to provide the Owner with the extended warranty for the installation offered by the manufacturer.

E. All work performed by the Contractor shall be available for observation and approval by the Manufacturer, the Owner, and the system Designer in order to verify the systems integrity and increase the performance of the system under the installation and performance guidelines described in the Contract Documents.

1.11 CODES, REGULATIONS & STANDARDS

A. The installation shall comply fully with all government authorities, laws and ordinances, regulations and codes applicable to the installation.

B. Should any change in plans or specifications be required to comply with governmental regulations, the Contractor shall notify the County representative and Architect at the time of submitting the construction schedule.

C. Local electrical and building codes may differ with national codes. Follow the most stringent code or recommendations. Where there are instances of ambiguity refer to the Architect for interpretation.

1.12 COORDINATION OF THE WORK

A. Carefully check space requirements and the physical confines of the area of work to insure that all material can be installed in the spaces allotted thereto, including conduits and cable supports.

B. Transmit to other trades in a timely manner all information required for work to be provided under the respective Sections in ample time for installation.

C. Wherever work interconnects with or contacts the work of other trades, coordinate with other trades to insure that all trades have the information necessary so that they may properly install all the necessary connections and equipment.

D. Due to the type of installation, a fixed sequence of operation is required to properly install the complete systems. Coordinate project and schedule work with the General Contractor in accordance with the construction sequence. Provide status of the installation to the General Contractor to allow them to update their project schedules.

E. The Contractor shall, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades or for proper compliance with the design intent.

1.13 DELIVERY, STORAGE AND HANDLING

A. Procedure: In Accordance with Division One, General Requirements.
B. Materials and equipment furnished shall be delivered in new condition and be of current production lots.

C. Deliver materials (except bulk materials) in manufacturer's unopened container fully identified with the manufacturer's name, trade name, type, class, grade, size and color.

D. Contractor shall ensure that material deliveries to work site shall be coordinated with construction manager responsible for materials distribution to all trades. Handle in accordance with Manufacturer's recommendations and instructions to avoid damaging equipment, installed devices and finish.

E. Store materials suitably sheltered from the elements, but readily accessible for inspection until installed. Store all items subject to moisture damage in dry spaces and protected from vandalism. Provide space requirements for storage in submittals list. The General Contractor shall assign storage space.

F. Contractor is responsible for all materials, tools and vehicles left on the job site.

G. Inspect and report concealed damage to carrier within specified time.

H. Contractor shall coordinate for the removal of all rubbish and packing materials produced by the Contractor's activities during the project.

1.14 CERTIFICATION & WARRANTY

A. All work and all items of equipment and materials shall be warranted by the Contractor for a minimum period of one year from the date of acceptance of the work. Where a manufacturer's warranty is longer than one year, the Contractor shall acquire and provide the extended warranty. The Contractor shall, upon notification of any defective items, repair or replace such items within 24 hours without cost to County, all to the satisfaction of the Architect.

B. All cables, connectors, patch panels, and patch cords provided must manufactured by the same Company to provide for a complete end-to-end solution. Mixed manufacturer solutions will not be accepted. High pair count copper requirements, if applicable, is separate from the end-to-end system requirement and may be a different manufacturer.

C. The installed passive network cabling components of the Work described in the Contract Documents shall be covered under a manufacturer-supported Limited Lifetime Warranty related to installed materials, supported applications and the installation workmanship. The Contractor shall be responsible for submitting all necessary applications, test results, and closeout data to the Manufacturer in order to register this project with the Limited Lifetime Warranty. It is the responsibility of the contractor to provide all forms/documents necessary to obtain the system warranty. Evidence of such warranty will be provided by Contractor as part of their contractual obligation and final retainage payments are contingent upon delivery to Owner of Manufacturers site warranty certificate. This guarantee and extended warranty shall be supported in writing by the manufacturer, mixed manufacturer solutions will not be accepted, and shall address and cover the following:

1. All defects in wire, cable, components and/or other materials in the Voice and Data Communication System.

2. All specification and performance parameters of system components as presented in the Construction Documents at the time of installation completion will be warranted/ guaranteed to provide performance margins as described in this document for all frequencies swept from 1 – 500 MHz (as appropriate) for the published ANSI/TIA-568-2 parameters for NEXT, PSNEXT, ACRF, PSACRF, and Return Loss performance standards as published in TIA/EIA.

3. All installed components of the data backbone system shall support ten (10) Gigabits per second Ethernet applications that use 850 nm transceivers for serial transmission in LOMMF (OM4) at distances up to three hundred (300) meters.

4. All workmanship associated with any warranty issues related to providing,

installing, certifying and documenting the Work described in the Construction Documents shall be covered by this warranty.

F. Contractor shall respond to the Owners request and correct any problems, malfunctions, and warranty issues associated with the Work described in the Construction Documents without additional charge to the Owner within three (3) calendar days for the entire warranty period, as stated in the Warranty.
G. Contractor warrants to the end-user that their installation practices and workmanship will adhere to all standards and Manufacturer's requirements. Contractor shall fix or repair any installation faults at their own cost. Should a defect or problem occur with any Manufacturers product the item(s) will be replaced by the certified contractor or a contractor approved by Manufacturer to perform warranty repair work.

F. The Owner considers the Voice Data Communications System components a whole, complete system with all cables, connectors, patch panels, and patch cords from the same manufacturer to provide for a complete end-to-end solution as described in the Construction Documents.

1.15 PROJECT CLOSEOUT

A. The installed Voice and Data Communications System will not be accepted until all work is complete and properly documented and all punch list items discovered are completed to the Designer and Owner's complete satisfaction.

B. The warranty will not begin until after a thirty (30) day acceptance period (See below for Acceptance Period information) to judge the performance of the installed Voice and Data Communication System. If during this thirty (30) day period the installed system does not perform adequately, the Trade Contractor must repair the installation within two (2) days to the satisfaction of the Designer and Owner and/or the Contract Documents and the thirty (30) days will restart from the date of the resolution.

C. The Trade Contractor's project manager must be available to answer questions about the installation and to attend site visits and meetings during the acceptance period.

PART 2 – PRODUCTS

2.01 DESCRIPTION

A. Provide telecommunications cable and termination equipment with performance levels and capacities as noted herein.

B. Any item not specifically shown on the drawings or called for in this section of the project specifications, but normally required to conform to the system design intent, are to be considered as part of the Contract and shall be included in the Contractor's scope of work.

C. The Construction Documents define the minimum acceptable quality by designating a manufacturer's trade or brand name and part number, by describing attributes, performance, or other standards. It is the responsibility of the Contractor to verify that all Contractor-proposed products and system components meet or exceed the minimum acceptable performance requirements outlined below, even for those listed in the "material" section(s).

D. All products designated as “or equal”, “or equivalent”, and “or acceptable substitute” indicate that an alternate product that equals or exceeds the product attributes may be substituted for that product so specified. The proposed alternate component(s) performance must be independently verified and documented. This independent verification documentation must be presented to the Owner or Designer for review and approval during the bid submittal process. The alternate product must be approved by the Designer and Owner prior to purchase, installation, and/or certification. Purchase and/or installation of any component without written approval of materials by the Designer and/or Owner is done at the Contractor’s own risk.

E. Any part numbers provided in this Specification has been coordinated with the manufacturers’ latest available product literature. Part numbers are subject to change without notice by the manufacturers. Where a specific part number is invalid, provide product meeting component description.

F. Contractor shall provide product submittals adequate to clearly demonstrate the conformance of the specific product to the attributes, performance, and standards set forth within the Construction Documents for all products prior to use after the bid submittal phase. Alternates proposed after the bid submittal phase are required to have written approval for use by the Designer.

G. All cable shall be rated and installed for the specific construction environment, unless otherwise noted in the Construction Documents. It is the responsibility of the Contractor to verify the installation environment prior to bid.

H. All products shall be new, unused, in perfect working condition, and in the original packaging containers upon arrival at the Project Site and also prior to installation. It shall be the Contractor’s responsibility to verify the status of the products and report, in writing to the Designer and Owner, any products that do not conform to the requirements described within the Construction Documents. Commencement of the Work described herein constitutes the Contractor’s acceptance of new, unused products as stated, being installed. Any products found to be non-conforming shall be replaced with conforming products by the Contractor at their expense immediately.

2.02 COMPONENT MANUFACTURERS

A. Subject to compliance with technical requirements of this section and the bid requirements provided in General Conditions, provide cable and equipment from the manufacturers as indicated herein as a complete connectivity and distribution “solution”.

B. Horizontal cables and terminations must be certified as a system. Manufacturers' specifications and guarantees of system compliance must be provided for acceptance.

C. Approved suppliers of the structured cabling system are Berk-Tek (a Leviton company) and Leviton Network Solutions only. Approved supplier of the support infrastructure components is ChatsworthProducts.

2.03 MATERIALS

A. Where specific items are called out in the specification or indicated on the drawings for a specific application, use those products or materials, or approved substitutes. Where no specific call outs are made use premium products and materials.

2.04 SUBSTITUTIONS

A. All products described by attributes and noted with the optional "or equal", "or equivalent", and "or acceptable substitute" indicate that an alternate product that equals or exceeds the specified product attributes may be substituted for that product so specified if approved by the Designer in writing prior to bid.

B. The alternate or equal designated products must be submitted for review and judgment to the Owner and Designer prior to inclusion in a Contractor's bid. The Contractor-proposed alternate products or components that meet or exceed the specified attributes must be published and verified by two (2) independent sources within the past 6 months.

C. The Contractor shall submit a written request for Designer and Owner approval of their use fourteen (14) elapsed days after the first pre-bid meeting date. This request shall include the two (2) independent sources, the original product's specification sheet, the proposed substitute product cut sheet, and a written request to review the substitute product that includes any cost impact (increase or decrease) associated with the request.

2.05 CABLE MEDIA

A. CATEGORY 6A 4-PAIR CABLE UNSHIELDED TWISTED PAIR PLENUM:

1. Category 6A cables made in the USA of solid annealed copper conductors insulated with FEP, 23AWG, with four individually twisted pairs with a central filler in a single round cable sheath. The cable core is surrounded by an insulated metallic isolation wrap and jacketed with a flame-retardant polymer alloy.

2. Characterized to 750 MHz, 250 MHz greater than the standard.

3. The Cat 6A plenum cable shall have a Universal Application Score (UA Score) of 8.6 verified to UL #B638581.

4. Cable shall have Flame Rating of Plenum-NFPA 70, CMP and ETL Listed as CMP-LP (0.7A).

5. The cable shall support up to 100 watts PoE with up to 720 cables in a bundle.

6. Outer diameter not to exceed 0.250" (6.35mm), CMP, typical

7. Colors as outlined in the T-series drawings.

8. Channel margin guarantees for TIA-568.2-D CAT6A and ISO/IEC 11801 ClassE_A (margin vs. TIA-568-2 and margin guarantees are for a standard 2-connector channel).

a.	Insertion Loss	3%
b.	NEXT	3 dB
c.	PSNEXT	4 dB
d.	ACR-F (ELFEXT)	8 dB
e.	PSACR-F (PSELFEXT)	8 dB
f.	Return Loss	3 dB
g.	ACR-N	4 dB
h.	PSACR-N	5 dB
i.	PSANEXT	4dB
j.	PSAACR-F	5dB

Approved Products:
Berk-Tek BLUE LANmark-SST Category 6A CMP cable #11101842 (1000')

B. CATEGORY 6 CABLE UNSHIELDED TWISTED PAIR PLENUM:

1. Category 6 cables made in the USA of solid annealed copper conductors insulated with FEP and FRPP, 23AWG, with four individually twisted pairs with a cross-filler in a single round cable sheath.

2. 100 ohm nominal impedance, UL Listed and independently verified as TIA/EIA Category-6 performance.

3. Characterized to 550 MHz, 300 MHz greater than the standard

4. The Cat cable shall have a Universal Application Score (UA Score) of 7.3.
5. Cable shall have a Flame Rating of Plenum-NFPA 262, CMP and UL Listed.
6. The cable shall support up to 100 watts PoE with up to 312 cables in a bundle.

7. Outer diameter not to exceed 0.225" (5.72mm), CMP, typical

8. Colors as outlined in the T-series drawings.

9. Channel margin guarantees for TIA-568-2 CAT6 and ISO/IEC 11801 Class E (margin vs. TIA-568.2-D and margin guarantees are for a standard 2-connector channel).

    a. Insertion Loss 5%
    b. NEXT 6 dB
    c. PSNEXT 6 dB
    d. ACR-F (ELFEXT) 8 dB
    e. PSACR-F (PSELFEXT) 9 dB

f. Return Loss 3 dB
g. ACR-N 8 dB
h. PSACR-N 9 dB

Approved Products:
Berk-Tek BLUE LANmark 1000 Category 6 CMP cable #10032094 (1000')

C. MULTI PAIR VOICE RISER CABLE:

1. Physical Specifications: 100 twisted pair – 24 AWG, solid copper conductors, 100 ohm nominal impedance +/-15%.

2. Electrical characteristics: All pair counts must meet Category 3 transmission requirements.

3. Cable Construction: individually insulated conductors with standard UTP color code markings, a minimum of two twists per foot under a rated sheath.

Approved Products:
Berk-Tek # 10032111, 25-pr CMP, Gray.
Berk-Tek # 10032396, 25-pr CMR, Gray
Other multiples of 25 pairs are acceptable (50, 100, 200, 300pr as required)

D. MULTIMODE HORIZONTAL/BACKBONE FIBER:

1. Physical Specifications: Core Diameter 50 µm, Cladding Diameter 125µm Laser-Optimized Multi-Mode Fiber, OM4.

2. Optical Characteristics: maximum fiber loss 3.0 dB/km @ 850 nm & 1.0 dB/km @ 1300 nm, minimum modal Bandwidth 4700 MHz @ 850 nm, 500 MHz @ 1300 nm. Must be able to support 1 Gb/s at distance up to 1,000 meters for 850 nm and 600 meters for 1300 nm, 10Gb/s up to 550 meters, and 40Gb/s or 100Gb/s up to 150 meters.

3. Armored Cable Construction: Cable shall be rated for use in plenum applications with fiber counts of 2 through 144 available. Cable shall consist of tight-buffered fibers with a dielectric strength member and be contained within an interlocking armor outer cover from end-to-end for protection.

4. Standard fiber Cable Construction: Cable shall be rated for use in plenum applications with fiber counts of 2 through 144 available. Cable shall consist

of tight-buffered fibers with a dielectric strength member and aramid yarn for protection.

5. Cable shall be indoor/outdoor when installed outside buildings, with a Dry-Gel system of water block. Indoor/Outdoor tight buffered fiber is not suitable for aerial lashing.

Approved Products:
Berk-Tek indoor Plenum OM4, # PDPxxxFB3010/F5
Berk-Tek Armored Plenum OM4, # PDPKxxxFB3010/F5
Berk-Tek Indoor/Outdoor Plenum OM4, PDPxxxFB3010/F5-I/O-C4(AQU)
Berk-Tek Indoor/Outdoor Armored Plenum OM4, PDPKxxxFB3010/F5-I/O-C4C5(AQU)Where:
xxx = # of strands, 006 -024.
Replace xxx with 12Bxxx for strand counts greater than 24 (036, 048, 072, 096, 120, 144)

E. SINGLE MODE BACKBONE OPTICAL FIBER CABLE:

1. Physical Specifications: Core Diameter 8.3 µm, Cladding Diameter 125 µm. Low-Water Peak (OS2) singlemode fiber, complies with ITU-T G.652D.

2. Optical Characteristics: maximum fiber loss 0.70 dB/km @ 1310 nm & 0.70 dB/km @ 1550 nm.

3. Cable Construction: cable shall be rated for use in plenum applications with fiber counts from 2 to 144 available. Cable shall have a dielectric strength member for strength and be contained within a Plenum Tight Buffered Cable with Aluminum Interlock Armor from end-to-end for protection.

Approved Products:
Berk-Tek 24-fiber indoor Plenum Singlemode, # PDP024AB0707
Berk-Tek 24-fiber Indoor Armored Plenum Singlemode, PDPK024AB0707
Berk-Tek 24-fiber Indoor/Outdoor Plenum Singlemode, PDP024AB0707-I/O-C4(YEL)
Berk-Tek 24-fiber Indoor/Outdoor Armored Plenum Singlemode, PDPK024AB0707-I/O-C4C5(YEL)

Where:
xxx = # of strands, 006 -024.
Replace xxx with 12Bxxx for strand counts greater than 24 (036, 048, 072, 096, 120, 144)

A. COPPER TERMINATION BLOCKS

1. Provide termination blocks for Backbone Cabling Systems that support up to Category 5e applications and facilitate cross-connection using twisted pair wiring.

2. The connecting hardware block shall support the appropriate Category 3 to 5e voice (non-VOIP) applications and facilitate cross-connection and/or inter-connection using cross-connect wire.

3. The cross-connect shall be Category 5e 110-style wiring bases, mountable to wall or backboard to provide 110 termination capable of supporting voice, security, and Category 5e data applications, including high megabit and shared-sheath applications when used with Category 5e rated cabling.

4. The components shall be UL listed and TIA-568.2-D compliant. Bases shall support 50, 100 or 300 pair densities with provision for TIA-606 compliant labeling. Plastic bases and blocks shall be made of fire-retardant plastic rated UL 94V-0.

5. Cross-connect blocks shall be available in a variety of insulation displacement clips (IDC) with and without tails, and support wire sizes: Solid: Wire Ranges 22-26 AWG (0.64mm - 0.40mm).

Approved Products:
Leviton 110 Connecting Block, 100-pair kit w/legs # 41AB2-1F4 (with C4)
Leviton 110 Connecting Block, 100-pair kit w/legs # 41AB2-1F5 (with C5)
Leviton Wire Manager w/legs, # 41A10-HCM

B. COPPER PATCH PANELS

1. Modular Insert Copper Termination Patch Panels shall exceed requirements for Category 6 and Category 6A described in TIA-568.2-D and Class E and E_A requirements described in ISO/IEC 11801 in a standard-density (24 ports per Rack Unit) or High-Density (48 ports per Rack Unit) format.

2. All copper termination panels shall be modular metal, 19” frame, flat, 2RU 48-port or 1RU 24-port, made of 16-gauge steel and powder-coated black with white silkscreened lettering that accept modular “RJ45”-style 8P8C jack inserts of any category rating, or blank inserts from the same manufacturer.

3. 48-port single Rack Unit panels may be required in space-constrained situations only. Confer with Owner prior to installation.

4. Panels shall utilize the same universal jacks as are used in workstation area outlets, and not a special purpose “panel jack”.

5. Modular jack inserts shall correspond with the colors outlined in the T-series drawings. Wiring scheme shall be T568B.

6. IDF Patch panel modular jacks shall match the outlet jacks at each workstation location (color, performance, and labeling).

Approved Products:
Leviton QuickPort® 1RU 24-port Patch Panel, # 49255-H24
Leviton QuickPort® 2RU 48-port Patch Panel, # 49255-H48
Leviton QuickPort® 1RU 48-port Patch Panel, # 49255-Q48*
* Order rear management bar separately

C. MODULAR CONNECTORS/JACKS:

1. Provide modular type 8-position/ 8 conductor (8P8C, RJ45-style) connectors (jacks) for network (data, voice, wireless, video, etc.) information outlets using 22-26 AWG copper cable. Connectors shall be individual snap-in style, and exceed compliance with TIA-568.2-D specifications.
2. The connectors shall utilize a universal Keystone-style (QuickPort) insertion footprint. Jacks shall fit existing Leviton patch panels and faceplates to facilitate the County’s ongoingoperations.
3. CAT6A Jacks shall comply with FCC Part 68; UL listed and CSA Certified. Verified to exceed all channel performance requirements in TIA-568.2-D from 1 MHz to 500MHz to support the IEEE 802.3 standard for 10 Gigabit Ethernetover UTP Cable
4. CAT6 Jacks shall comply with FCC Part 68; UL listed and CSA Certified. Verified to exceed all channel performance requirements in TIA-568.2-D from 1 MHz to 250MHz to support the IEEE 802.3 standard for 1 Gigabit Ethernet over UTP Cable
5. Every connector shall include polymer springs above the tines (“Retention Force Technology” or similar functionality) to promote return of tines to original position and protect against deformation due to stress of patch cords or inappropriate materials insertion.
6. Connector shall have Pair Separation Towers on IDC to facilitate quick, easy terminations without a complete untwist of each pair of conductors. Jacks shall employ 2 or more circuitry solutions for dampening of NEXT.
7. The connector shall be rear 110-type insulation displacement connectors (IDC) with solder-plated phosphor bronze contacts, configured in a 180° orientation such that the punch down field is in the back, allowing for rear termination.
8. All plastics used in construction of the connector bodies shall be fire-retardant

with a UL flammability rating of 94V-0.

9. The connector shall provide a ledge directly adjacent to the 110-style termination against which the wires can be directly terminated and cut in one action by the installation craftsperson.
10. Connector wiring label shall provide installation color codes for both T568A and T568B wiring schemes on separate labels.
11. Category 6A (CAT6A) connectors shall support 10G and will feature an injection molded Cone of Silence™ technology to eliminate alien crosstalk (AXT).
12. Category 6A/6 connector module will exceed IEEE 802.3bt standard to support up to 0.5 amps per conductor (100 watts) continuously.

Approved Products:

Leviton eXtreme CAT6A QuickPort Module # 6110G-R*6
Leviton eXtreme CAT6+ QuickPort Module # 61110-R*6
Leviton eXtreme CAT5e+ QuickPort Module # 5G110-R*5

Where * = one of 13 colors. White=W, Light Almond=T, Blue=L, Ivory=I, Yellow=Y, Orange=O, Crimson=C, Dark Red=R, Purple=P, Green=V, Gray=G, Black=E, Brown=B. See drawings or check with County for application.

D. FIELD-TERMINABLE MODULAR PLUGS

1. The plug shall BE universal IN DESIGN, and meet or exceed all performance requirements for Category 6A and below as described in ANSI/TIA-568.2-D, as well as Class E_A requirements as described in ISO/IEC 11801-1.

2. The plug shall comply with all National Electrical Codes, be compliant with ANSI/TIA-1096-A, and be UL listed. The plug shall be compliant with UL 2043 for use in air handling spaces.

3. The plug shall meet all requirements of IEC 60603-7 (including IEC 60512-5-2) and IEC 60512-99-001(including IEC 60512-9-3) standards.

4. The plug shall be encased in a 360-degree die-cast housing to protect it from potential EMI/RFI.

5. The plug shall not require a specialized termination tool.

6. The plug wiring shall accommodate 26-22 AWG solid or stranded conductors and terminable in both T568A and T568B wiring schemes. T568B shall be used.

7. The plug may be used to terminate to horizontal cable when connecting to Ethernet devices placed in fixed locations as recognized in ANSI/TIA-

568.2-D Annex F- Modular Plug Terminated Link (MPTL), ANSI/TIA-

862-B Annex C- Direct Connections, and ISO 11801-6 Type B generic cabling.

8. The connector module shall support IEEE 802.3at, IEEE Draft 802.3bt POE standards, and Power over HDBaseT™ (POH) applications up to 100 watts

Approved Products:
Leviton Cat 6A Universal Tool-Free Plug, # 6APLG-S6A

E. Category 6A Field Installable Coupler with Terminated Patch Cord
1. The coupler patch cord assembly shall meet or exceed all requirements for Category 6A as described in ANSI/TIA-568.2-D.

2. The coupler patch cord assembly shall be compliant with ANSI/TIA-1096-A and NFPA-70 CMP rated for installation above a drop ceiling or in other air handling spaces.

3. The coupler patch cord assembly shall be constructed with a zinc alloy body designed for use in both UTP and shielded channels.

4. The coupler patch cord assembly shall not require a specialized termination tool.

5. The coupler patch cord assembly wiring shall function in either T568 A/B wiring schemes.

6. The coupler patch cord assembly shall accommodate 22-26 AWG solid or stranded conductors.

7. The coupler patch cord assembly shall comply with the following POE standards:

a. IEEE 802.3at (Type 1) Power over Ethernet (PoE) applications up to 15.4 watts

b. IEEE 802.3at (Type 2) Power over Ethernet (PoE+) applications up to 30 watts,

c. IEEE 802.3bt (Type 3) Power over Ethernet (PoE+) applications up to 60 watts

d. IEEE 802.3bt (Type 4) Power over Ethernet (PoE+) applications up to 90 watts

e. Cisco Universal Power Over Ethernet Plus (UPOE+) applications up to 90 watts

f. Power over HDBaseT™ (POH) applications up to 95 watts

.

8. The coupler patch cord assembly shall be 26 AWG stranded conductor cable with an outside diameter of 0.223" for the patch cord.
9. The coupler patch cord assembly shall be terminated with an 8-position modular plug on one end.
10. The coupler patch cord assembly shall have a standard cable length of 18-inches. Custom lengths and colors available upon request.
11. The coupler patch cord assembly shall be available in White, Blue, and Gray cable colors.

Approved Products:

Leviton VXC™ Plenum Assembly SBCPI-18*
* = Colors: White (W), Blue (L), Gray (S)

F. OUTLETS & WALLPLATES

1. Contractor shall provide and install single gang faceplate kits to allow up to six data or voice jacks as required for all work area outlets, workstation base feeds, and unused telecom backboxes and furniture openings.
2. Faceplates shall utilize a Quickport ("keystone"-style) footprint to match the approved connectivity manufacturer, and be made by the same manufacturer as the connectors.
3. Faceplates shall support any connectivity media type, including fiber and copper applications, and shall be available in single-gang and double-gang configurations.
4. Surface-Mount Blocks (SMBs) are used to protect terminated CAT6 and CAT6A cables at the endpoints where they are not contained within walls or furniture. Example locations may be Wireless Access Points (WAPs) or other network-enabled device locations.
5. SMB shall be Plenum-rated for use in Plenum environments.

Approved Products:

Leviton QuickPort Single-Gang with ID Windows, # 42080-#xS
Leviton QuickPort Double-Gang with ID Windows, # 42080-#xP
Leviton QuickPort Blank Inserts, pack of 10, # 41084-0Bx
Leviton QuickPort Surface-Mount Box, # 41089-#xP

Where:

# = number of ports: 1, 2, 3, 4, 6
x = color: White (W), Ivory (I), Light Almond (T), Gray (G), Black (E)
Match colors and materials of the power wiring device plates

G. CATEGORY-RATED PATCH CORDS:

1. Standard copper patch cords for CAT6 and CAT6A UTP locations shall be 26-

gauge stranded conductor construction (0.24” OD), with a standard 8-position modular (RJ45) plug on both ends.

a. Maximum Outer Diameter of 0.24”
b. Power over Ethernet (PoE and PoE+) compatible
c. Support 1 Gigabit applications over 90-meter permanent links with up to 10 meters of cordage
d. Meets all applicable standards and listings: ANSI/TIA-1096-A (formerly FCC Part 68), RoHS compliant, IEEE 802.3, PoE: IEEE 802.3bt

2. High-flex copper patch cords for CAT6UTP cable systems used inside Telecom Enclosures, Rooms and racks may be 28-gauge stranded conductor construction (0.15” OD CAT 6), with a standard 8-position modular (RJ45) plug on both ends.
3. High-flex copper patch cords for CAT 6A UTP cable systems used inside Telecom Enclosures, Rooms and racks may be 28-gauge stranded conductor construction (0.185” OD Cat 6A) with a shielded 8-position modular (RJ45) plug on both ends to be used in shielded and unshielded channels.

4. Copper patch cords shall be Power over Ethernet (PoE and PoE+) compatible and certified to support 1 Gigabit (CAT6) or 10Gigabit (CAT6A) applications over 90-meter permanent links. Cords shall meet all applicable standards and listings, such as ANSI/TIA-1096-A (formerly FCC Part 68), RoHS, IEEE 802.3, and PoE: IEEE 802.3bt

5. Copper patch cords used in Plenum spaces shall be Plenum-rated. Cat 6A Plenum patch cords shall be universal, can be used in both shielded and unshielded channels.

6. Copper patch cords shall not have an overmolded rubber “boot” which covers the release tab.

Approved Products:
Leviton “Slimline” CAT6 Patch Cord, #6D460-xx*
Leviton “Slimline” CAT6A Patch Cord, #6AS10-xx*
Leviton High Flex 10G Cat 6A Patch Cords,#H6A10-xx*
Leviton High Flex 1G HD6 Patch Cord, for CAT6 systems, # 6H460-xx*
Leviton Plenum-Rated CAT6A Patch Cord, #6ASP0-xx*
Where
xx = Length in Feet (01, 03, 05, 07, 10, 15, 20 standard)
* = color, **W**hite, **Y**ellow, **R**ed, b**L**ue, **G**reen, **S**late (Gray), **E** (Black)

H. FIBER TERMINATION ENCLOSURES:

1. Shall provide cross connect, inter connect, and splicing capabilities and contain cable management for supporting and routing the fiber cables/jumpers.

2. Fiber enclosure shall be available in 1, 2 and 4RU versions to accommodate termination and splicing of fiber as outlined in the T-series drawings.

3. Enclosure depth shall be 17” and shall fit into a standard 19” rack. The combination shelf shall be able to support the terminations associated with the fiber cables and connectors as well as any splice cases required

4. Enclosure shall feature a sliding tray which removes completely, front or rear, from enclosure to facilitate field terminations and splicing.

5. Rack-mount enclosure shall have removable transparent hinged doors and slide away covers allow easy access during install and visibility of interior after install.

6. Fiber Adapter Plates (bulkheads) shall accept SC and/or LC connectors, MTP® adapters, and plug-n-play MTP modules/cassettes.

7. Fiber cable management for routing, storage, and protection shall accept patch cords, tight-buffer fiber, and backbone cables. Rear fiber cable management rings shall be stackable and configurable in ¼, ½, or full ring arrangements. Enclosure shall be constructed of 16-gauge steel with a powder-coated black finish and an optional locking door feature shall be available.

8. Enclosure shall support the use of splice cassettes in a standard adapter plate footprint.

Approved Products:

Leviton Opt-X 2000i SDX Rack-Mount 1RU Enclosure, # 5R1UH-S03 Leviton Opt-X 2000i SDX Rack-Mount 2RU Enclosure, # 5R2UH-S06 Leviton Opt-X 2000i SDX Rack-Mount 4RU Enclosure, # 5R4UH-S12 Leviton lock and key # 5L000-KAL

Leviton armored cable ground kit, # DPGRD-KIT

I. FIBER TERMINATION PANELS AND MODULES:

1. The adapter plate shall be offered in LC, SC, and MTP styles in 6, 12, or 24 fiber configurations. The adapter plate shall be compliant to ANSI/TIA-568.3-D (for performance) and respective ANSI/TIA-604-X (for intermateability) standards, and shall be made in the United States of America.

2. Adapter plates shall use zirconia ceramic sleeves and be offered in standard fiber type colors pursuant to ANSI/TIA-568.3-D standards. The adapter and plateshall be precision molded to eliminate “rattle” and loose fit.

3. SDX Integrated Fiber pigtail fusion splice modules shall be offered in 12- or 24-fiberLC in OS2 (Singlemode) and OM4 fiber types. Construction of module shall beof 14-gauge aluminum for robustness and light weight.

4. SDX Splice Modules shall be pre-loaded and routed with respective 3-meter, color- coded pigtail assembly. Individual pigtails shall have maximum insertion loss of 0.4 dB and 0.35 dB for OM4 and OS2 fiber types, respectively. Return Loss

shall be greater than -25 dB (for OM4), and -55 dB (for OS2/UPC).

5. SDX Splice Modules shall contain individual compartments which provide slack storage and bend radius protection for incoming backbone fibers, 900µm tight- buffer fibers, and fusion-spliced fibers. Incoming 250µm backbone fibers shall be protected by a braided mesh sleeve. Heat shrink style splice sleeves, braided mesh sleeve, and tie wraps shall be included with splice module.
6. HDX pigtail fusion splice modules shall be offered in 12-fiber LC and 36-fiber MTP configurations in OS2 and OM4 fiber types. Pigtail shall be preconfigured to allow for termination to loose tube, tight buffered, or ribbon fiber cables without modification or replacement.
7. HDX splice module construction shall be polycarbonate for robustness and lightweight.
8. HDX splice module individual pigtails shall have maximum insertion loss of 0.15 dB)OM4) and 0.25 dB (OS2) for LC. For MTP a maximum insertion loss of 0.35 dB max on both OM4 and OS2.
9. HDX splice module shall provide slack storage and bend radius protection for incoming backbone fibers, 900 µm tight-buffer fibers, and fusion spliced fibers. Incoming 250 µm or ribbon backbone fibers shall be protected by a braided mesh sleeve. Heat-shrink style splice sleeves, a ribbon splice sleeve, a braided mesh sleeve, and tie wraps shall be included with module.

Approved Products:

Leviton 12-strand SDX Adapter Plate, LC, SM, #5F100-2LL
Leviton 12-strand SDX Adapter Plate, SC, SM, #5F100-2LC
Leviton 24-strand SDX Adapter Plate, OM3/4, #5F100-4QL
Leviton Opt-X 12-Fiber SDX Splice Module, SM, # SPLCS-12L Leviton Opt-X 12-Fiber SDX Splice Module, SM, SC, #SPSCS-12LLeviton Opt-X 24-Fiber SDX Splice Module, OM4, # SPLCS-244
Leviton HDX to SDX Adapter Bracket, #HDXAD-ACC
Leviton HDX 12-Fiber OM4 LC Shuttered Aqua Splice Module, #SPLCH-12AQ
Leviton HDX 12-Fiber OS2 LC Shuttered Blue Splice Module, #SPLCH-12BL
Leviton HDX 36-Fiber (3x12 fibers) OM4 MTP, Male #SPMPH-MMPN
Leviton HDX 36-Fiber (3x12 fibers) OS2 MTP, Male #SPMPH-SMPN

J. FIBER CONNECTORS

1. Pre-polished fiber optic connectors shall meet or exceed the requirements described in TIA-568.3-D and ANSI/TIA-604-5 (LC) Connector IntermateablityStandards

2. Shall be pre polished and field installable to eliminate the need for hand polishing, bonding, or epoxy in the field.

3. Shall utilize a precision zirconia ceramic ferrule, and be re-terminable up to 3 times during testing without loss of performance.

4. Shall require the use of a cleaver with a guaranteed maximum cleaving angle of 2 degrees for multimode and 1 degree for singlemode fibers.

5. Shall be provided in LC, single-mode or multimode (laser optimized) configurations, terminated on 250 or 900 µm buffered fiber and/or 2mm or 3 mm jacketed fiber.

6. Maximum connector insertion loss shall be no greater than 0.5 dB, with an average of 0.1 dB (MM) or 0.2dB (SM). Typical connector return loss shall be -25 dB (multimode) and -55 dB (single mode). All versions shall allow continuity to be verified by use of a visual fault locator (VFL).

Approved Products:

Leviton FastCAM LC Singlemode, # 49991-SLC
Leviton FastCAM LC OM3/OM4 Multimode, # 49991-LLC
Leviton / Lynx cleaver # 49886-LNX or equal

K. FIBER JUMPERS AND ARRAY CORDS

1. Fiber optic LC-LC patch cords shall be factory-manufactured, terminated and polished using Singlemode OS2 and Laser-Optimized OM4 Multimode optical fiber. Field terminations on fiber jumpers are not acceptable.

2. Shall utilize A-B polarity, and exhibit <0.35 dB insertion loss for single-mode and 0.4 dB per mated for multimode. Multimode patch cords shall meet an optical return loss equal to or greater than 25 dB per mated pair, and single-mode equal to or greater than 50 db for UPC polish.

Approved Products:
Leviton Economy LC-LC SM duplex jumper, UPDLC-Sxx
Leviton Economy LC-LC OM4 duplex jumper, 54DLC-Mxx
(xx = Length in Meters, for example, 03 or 10) as required

L. 2-POST RELAY RACKS:

1. 19” EIA-310 standard universal telecommunications equipment rack. 7 ft. high
2. Suitable for mounting approved modular patch panels, wire management and active network equipment. Must be seismically restrained.
3. Use vertical cable raceways at ends of rows (6”) and between each frame (10”), and horizontal cable management panels added as needed (if indicated in the T-series drawings).

Approved Products:
Chatsworth 55053-703, Aluminum Relay Rack, Black

M. ADJUSTABLE FOUR POST SERVER RACK:

1. 19” EIA-310 standard steel, 4-post adjustable equipment frame, 7 ft high x 29.5-35.4” deep,
2. Suitable for mounting approved modular patch panels, wire management and active network equipment. Must be seismically restrained.
3. Use vertical cable raceways at ends of rows (6”) and between each frame (10”), and horizontal cable management panels added as needed (if indicated in the T-series drawings).
4. Square-punched mounting holes. Include (50) 12/24 square nuts and bolts.

Approved Products:
Chatsworth 15213-703, Adjustable Server Rack, Black
Chatsworth 12639-007, square nuts and 12/24 hardware kit, packs of 25

N. WALL-MOUNT CABINET:

1. 19” EIA-310 standard steel, internal 4-post reinforced frame, 3 ft high, complete with vertical cable raceway channels and horizontal cable management panels (if indicated in the T-series drawings). Suitable for mounting approved modular patch panels, wire management and active network equipment.

2. Chatsworth Cube-IT Plus Cabinet

2.07 MANAGEMENT HARDWARE

A. CABLE MANAGERS:

1. Rack mounted, Double sided Slotted MCS Master Cabling vertical cable manager.
2. Rack mount, Double sided 19” Horizontal Universal Wire Management Panel
3. Wall-mount Fiber Slack Storage Rings

Approved Products:

Chatsworth 30096-703, 10” Vertical Wire Manager, Black
Chatsworth 30095-703, 6” Vertical Wire Manager, Black
Chatsworth 30529-719, Horizontal 1U Wire Manager, Black
Chatsworth 30530-719, Horizontal 2U Wire Manager, Black
Leviton 12” Inside Plant Cable storage ring, 48900-IFR
Leviton 24” Outside Plant/Armored Cable storage ring, 48900-OFR

2.08 CABLE PATHWAYS

A. EMT Steel Conduit for horizontal cable. (Installed by Others). The horizontal cable system will be totally enclosed. The cable will run in conduit and through junction boxes. The conduit system will extend from the station outlet box to the telecommunications Rooms.

B. Non-Continuous Cable Supports (Multi Tiered J Hook Assemblies) for cables not in conduit.

1. Multi- tiered non-continuous cable support assemblies shall be used to support telecommunications cables in accessible ceiling areas. Assemblies may be factory assembled or assembled from pre-packaged kits. Assemblies shall consist of a steel angled hanger bracket holding up to six non-continuous cable supports, rated for indoor use in non-corrosive environments; UL Listed.

2. Provide all necessary hardware for installing multi-tiered support brackets in accessible ceiling spaces. These spaces may include T-bar ceiling, threaded rod spaces, and or direct mounting to concrete wall or ceiling.

Approved Products
BLINE BCH32-1D, 2 x 2" J-hangers on a support
BLINE BCH64-1D, 2 x 4" J-hangers per support
BLINE BCH32-2D, 2 x 2" J-hangers per support
Other sizes or equivalent

C. Overhead and In-Box Brackets

1. Above-ceiling cable termination locations shall be either wall-mounted or suspended from structure above the drop ceiling. Cables or terminations shall not rest on ceiling grid or equipment above ceiling grid.

2. For Wireless access Points and other above-ceiling-mounted communications devices, cables shall land in an above-ceiling bracket which is affixed to dedicated cable support hardware. Above-ceiling bracket can hold 2 jacks, a 2-port Surface-Mount Box, or a 1U MOS SMB for multimedia applications.

3. For wall-mounted device locations (above or below ceiling), devices needing to be mounted directly to a backbox will utilize the in-wall mounting bracket to secure the jack inside the backbox.

4. One category-rated jack can be installed in each in-wall backbox jack mounting bracket. For devices requiring (2) category-rated jacks, (2) in-wall brackets must be used.

Approved Products:
Leviton QuickPort In-Ceiling Bracket, rod/wire hanger, 49223-CBC
Leviton QuickPort In-Ceiling Bracket for beam and screw mounts, 49223-CB0
Leviton QuickPort In-Wall Bracket, 49223-BA5 (pack of 5)

D. Cable Runway Support and Pathway System.

1. All industry standard cable runway shall be manufactured with tubular steel rails twelve inches (12”), fifteen inches (15”), eighteen inches (18”) or twenty-four inches (24”) in width configures with industry standard on and on-half inch (1.5”) ladder cross bars positioned twelve inches (12”) on center perpendicular to the rails, as indicated in the Project Drawings.

2. Cable runway system shall include structural engineered and approved components to provide and install the necessary zon-4 seismic support system including end caps, wall angle support brackets, bonding straps, butt splice kits, junction splice kits, and rack-to-runway mounting kits.

3. The cable runway system shall include a corner section at each intersection that creates a radius “L”, “X”, and/or “T” formed when two (2) or more pieces of cable runway are connected together with a junction splice assembly.

4. The cable runway system shall include all components indicated in the T-series drawings to complete the system. These components shall be available from the same manufacturer and shall include, but may not be limited to:

   a. Cable runway bend radius drop assemblies (sized per runway section)
   b. Cable runway movable cross member assemblies to support cable runway bend radius drop assemblies (sized per runway section).
   c. Runway butt-splice kits
   d. Runway junction splice kits
   e. Cable runway corner brackets (sized per runway and site conditions)
   f. Swivel splice kits
   g. Rack-to-runway mounting plates (sized per runway section)
   h. Cable elevation kits (sized per site conditions)
   i. Wall angle support brackets (sized per runway section)
   j. Runway foot kits
   k. Threaded rod assemblies for attachment
   l. Slotted Support brackets for runway attachment to threaded rod assemblies
   m. Vertical wall brackets
   n. Cable retaining posts (6” as required)
   o. Runway grounding kits
   p. Protective end caps

6. All cable runway components shall be black in color, unless otherwise noted in the Project Drawings.

6. Cable Runway System Manufacturer
   a. Chatsworth Runway System and Components.

2.09 FIRESTOPPING

A. Fire rated pathway devices shall be the preferred product and shall be installed in all locations where frequent cable moves, add-ons and changes will occur. Such devices shall:

1. Meet the hourly rating of the floor or wall penetrated.
2. Permit the allowable cable load to range from 0% to 100% visual fill thereby eliminating the need to calculate allowable fill ratios.
3. Permit multiple devices to be ganged together to increase overall cable capacity.
4. Allow for retrofit to install around existing cables.
5. Include an optional means to lengthen the device to facilitate installation in thicker barriers without degrading fire or smoke sealing properties or inhibiting ability of device to permit cable moves, add-ons, or changes
6. Not require any additional action on the part of the installer to open or close the pathway device or activate the internal smoke and fire seal, such as, but not limited to:
   a. Opening or closing of doors.
   b. Twisting an inner liner.
   c. Removal or replacement of any material such as sealant, caulk, putty, pillows, bags, foam plugs, foam blocks, or any other material.
7. Where single cables (up to 0.27 in. (7 mm) diameter) penetrate gypsum board/stud wall assemblies, a fire-rated cable grommet may be substituted. Acceptable products shall be molded from plenum-grade polymer and conform to the outer diameter of the cable forming a tight seal for fire and smoke. Additionally, acceptable products shall lock into the barrier to secure cable penetration.

Approved Products:
Specified Technologies, Inc. EZ-PATH series 22, 33 and 44+ fire-rated pathway devices
Specified Technologies, Inc. EZ-PATH GROMMET

B. Where non-mechanical products are utilized, provide products that upon curing do no re-emulsify, dissolve, leach, breakdown or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water or other forms of moisture characteristic during or after construction.

1. Where it is not practical to use a mechanical device, openings within floors and walls designed to accommodate telecommunications and data cabling shall be provided with re-enterable products that do not cure or dry.

2. Utilize an EMT sleeve as a stub through a rated wall
3. Surround annular space between EMT sleeve and wall material with a hardening intumescent caulk.
4. Utilize re-enterable, non-hardening putty around cables inside a metal sleeve. Do not exceed 40% fill capacity of sleeve and follow all rated assembly requirements per Manufacturer, local codes, and AHJ.
5. Cable trays shall terminate at each barrier and resume on the opposite side such that cables pass independently through fire-rated pathway devices. Cable tray shall be rigidly supported independent from fire-rated pathway devices on each side of barrier.

Approved Products:

Specified Technologies, Inc. SSS Intumescent Caulk
Specified Technologies, Inc. SSP Intumescent Putty

2.10 LABELS

A. Labels:

1. Laser printed self-adhesive, smudge resistant self-laminating labels for cables and faceplates. Labels shall be appropriately sized for cable diameter. Labels shall be appropriately colored for faceplate color contrast.

    a. Black text on clear tape for Stainless Steel and Ivory surfaces
    b. Black text on white background for White surfaces and white label backgrounds
    c. White text on black background for labeling on Black surfaces

2. Wrap-around cable labels shall be min. 1” wide, and of sufficient length to wrap around the entire cable with multiple lines of a repeating label, visible from any orientation.

Approved products:

Brother P-Touch TZe tapes, 3/8”, ½” widths x 26.2’ per cartridge (or as required)
Brother P-Touch TZe Flexible-ID tapes, 1”, and 1.5” widths x 26.2’ per cartridge, for cable wraparound labeling
Brother P-Touch TZe tapes, 1” or 1.5” Width, white text on black background, for rack labels and other high visibility equipment purposes

PART 3 – EXECUTION

3.01 EXAMINATION

A. Contractor shall examine the site conditions and telecommunications spaces associate with the work and the conditions under which the Work would be performed prior to beginning work. Contractor shall remedy conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 METHODS AND PROCEDURES

A. Examine and compare the Telecommunications Drawings and Specifications with the Drawings and Specifications of the other trades. Report any discrepancies between them to the Architect, and obtain from them written instructions for changes necessary in the work. At time of bid, the most stringent requirements shall be included in the bid.

B. Install and coordinate the telecommunications cabling Work in cooperation with other trades installing interrelated work. Before installation, make proper provisions to avoid interference in a manner accepted by the Architect. Any repairs or changes made necessary in the Contract Work, caused by the Contractor's neglect, shall be made by him at his own expense.

C. The Contractor shall maintain a complete file of Shop Drawings and other submissions, including the Project specifications and the drawings, at the job site always. Shop Drawings and all other submissions shall be made available to the Architect and County representative at their request.

D. The Contractor shall follow manufacturers' instructions for installing components and adjusting all equipment and telecommunications cables. Submit two (2) copies of such instructions to the Architect before installing any equipment. Provide a copy of such instructions at the equipment during any work on the equipment. Where no instructions are included with the equipment, follow accepted industry practices and workmanlike installation standards.

E. Perform all tests required by local authorities in addition to test specified herein.

F. Do not allow telecommunication cables to run parallel with electrical cables/conduits, unless they are separated by a minimum of 12 inches. Note: any telecommunications cables that must cross over electrical cables/conduits shall do so only at 90-degree angles.

G. Ensure that all telecommunications cable supports (conduits, support grips, J hooks) are fully installed before proceeding with cable installation. At no times shall cables be installed and left unsupported. At no times shall cables be tie-wrapped to any other supporting structure in lieu of specified cable supports. Do not bundle or tie-wrap the cables even within the approved cable supports.

H. For installation of Non-Continuous Cable supports (Multi-Tiered J Hook Assemblies), ensure cable is supported with J Hooks every 4 to 5 feet. No cable shall remain unsupported for more than 5 feet.

I. Do not lay telecommunications cables unprotected on the floor at any time. If cables must be left on any floor, protect the cables so that they may not be walked on or have any material or equipment placed or rolled on top of them at any time.

J. Maintain manufacturers' recommended minimum bend radius of the cables, at all times (minimum bend radius may be as small as 2 inches for 4-pair UTP). Do not stretch, stress, tightly coil, bend or crimp the workstation cables during the installation or when leaving them out of the way of other trades during the staging work. The Contractor, at the Contractors expense, shall replace all abused or stressed cables.

K. Keep all items protected before and after installation, with dust and waterproof barrier materials as necessary. The Contractor shall be responsible to ensure the integrity of the protective measures throughout the life of the project.

L. Clean up and remove all debris generated by installation activities. Keep the telecommunications areas free of debris at all times.

M. Deliver to County's representative, two sets of all special tools specifically needed for proper operation, adjustment and maintenance of cable and cable termination hardware installed under this Contract.

N. Upon project completion, provide as-built drawings and documentation as defined herein.

O. Craft personnel shall be qualified to perform the work activities and be knowledgeable of the following:

1. Color coding of standard UTP cables.

2. Bonding and grounding of cable tray and equipment racks.

3. Testing conductors for electrical continuity.

4. Testing of copper conductors for wire mapping, attenuation and worst case near end cross talk and other tests as required by ANSI/TIA-568.1 and 568.2.

5. Termination or connectorization of unshielded twisted pair cable on all specified connectors and termination.

6. Generally accepted industry standards, as well as manufacturers written installation instructions, will be used for in-process quality control and final acceptance of the work installation.

P. Check actual job conditions prior to start of any work. Ensure all preceding trade work associated with the telecommunications system in accurate before proceeding with the installation. The Contractor will be responsible for inspecting the previously performed work of other trades, and commencement of work will serve as evidence of the acceptance of this work as suitable for the work to follow. Notify in writing the Owner and Designer of any discrepancies that will impact the telecommunications system prior to commencement of said work. Examples of work which must be checked include, but are not limited to:

1. Electrical requirements (conduit installation and capacity)

2. The telecommunications rooms are the size shown on the Project Drawings.

3. Adequate clearances of doors, riser spaces and ceilings for all component of the telecommunications system.

3.03 INSTALLATION

A. Equipment Racks and Cabinets

1. Provide, as shown on drawings, rack and cabinets in the respective ER/TRs roomsor termination locations for the mounting of termination panels and IT equipment. Bolt each rack to the floor slab and attach the cable runway system overhead via cable runway elevation kits per the manufacturer's recommended installation instructions. Bond each individual rack and cabinet directly to the grounding busbar located within the room/space.

B. Termination Components:

1. Provide fiber combination shelf in rack mount frame for mounting into racks and cabinets as indicated in the project drawings with a minimum of 48 port

capacity. Provide and install correct adapters for fiber termination, complete with designation strips & any required cable managers.

2. Provide Wall Outlets & faceplates containing 8-pin 8-conductor modular connectors, non-keyed (8P8C), typical "RJ45" style; complies with ANSI/TIA-568.2-D, Category 6 or 6A performance specifications as determinedby application. Outlet wired with standards compliant T568B pinning. Coordinate faceplate color and jack color with T-series drawings.

    a. WIRELESS ACCESS POINTS (WAP): Install (2) CAT6A cables per WAP location.
    b. VIDEO CAMERAS: Install (1) CAT6A cable per location.
    c. WORK AREA OUTLETS: Install (3) CAT6 cables to each standard Work Area Outlet (WAO).

3. Provide IDF modular termination jacks at patch panels as 8-pin modular connectors, non-keyed (RJ45) connectors; complies with TIA-568.2-D, Category 6 or 6A performance specifications as appropriate to match cable and jacks at both ends. Wired with standards compliant T568B pinning. Coordinate jack colors with T-series drawings. Install black colored blank modular inserts into unused patch panel ports.

4. Provide one 7' and one 10' patch cord for each WAO location as shown on drawings, specified by County or approved as change.

    a. Patch cord Category shall match the rating of the link for which they are provisioned.
    b. Plenum locations shall require one CMP and one CM/CMR cord per location. CM cord to be used at ER/TRs and CMP cord to be used in ceilingplenum space.
    c. Confirm final lengths, quantities, Categories, ratings and colors of cords with County prior to ordering.

C. Cable Media:

1. Install riser UTP cable in accordance with this Specification in quantities indicated in the project drawings and terminate all UTP cable pairs (except the 25th pair in each binder group – coil for future use) on patch panels as indicated in the T-series drawings. Comply with the manufacturers' recommendations, and the Telecommunications Distribution Plan Drawings.

2. Install riser fiber cable in accordance with this Specification in quantities indicated in the T-series drawings from each TRs and to the ERs. Comply with the manufacture's recommendations, and the Telecommunications Distribution Plan Drawings.

3. After dressing the cable to its final location, remove only enough sheath to allow the conductors to be splayed and terminated in a neat and uniform fashion. Every effort will be made to maintain sheath integrity by removing only as much sheath as is practical, to accomplish termination. For UTP cables, maintain the manufacturers twisting of the wire pairs through to the point of termination, with a maximum untwist of 1/8".

4. There shall be no splices or mechanical couplers installed between the cable points of origin and termination for the inter-building and intra-building cable.

D. Cables:

1. Provide 4-pair Category 6 cables from each workstation telecommunications outlet location (for standard type outlets) or 4-pair Category 6A cables from each camera or WAP telecommunications outlet location to the respective Telecom Room termination location as indicated in the project drawings. Cables to be color-coded consistent with T-series drawings. For additional workstation types as indicated on the telecommunications drawings route the correct amount of Category-rated cable from each workstation telecommunications outlet location to the respective termination location. Utilize the cable tray system for the routing of cables whenever possible. Terminate all cables onto 8-pin modular connectors at the outlet location. Terminate the four-pair cables onto rack mounted, metal modular data jack insert patch panels.

2. Where telecommunications outlets are wall mounted inside enclosed offices, route cables overhead from the termination location (ERs/TRs) via the overhead cable tray network to the outlet area, and down a conduit stub-upto a junction box at the bottom of the conduit. Mount outlets with an appropriate faceplate.

3. Where workstation outlets are mounted in drywall partitions to support seating in the common areas, route cables from the termination location (IDF) to the accessible ceiling area within the commons area and down a conduit stub-up to a junction box at the bottom of the conduit. Mount outlets with an appropriate faceplate.

4. Cables shall be neatly bundled and dressed to their respective termination

device. Each terminating device shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.

5. Cable bundles shall not be painted.
6. Cable bundles shall be wrapped in Velcro tie wraps. No nylon tie wraps shall be used in any location of the install.

E. Cable Runway and Non-Continuous Cable Supports (Multi-Tiered J Hook Assemblies):

1. Provide cable runway and associate runway components in the TRs, ERs and termination locations as shown on the T-series drawings. Mount cable runway overhead at the indicated height following manufacturer's installation instructions at all times.

2. Provide threaded rod ceiling support assemblies spaced 5' on center, wall angle support kits, or triangular support brackets to support the cable runway over head (where required) as indicted in the T-series drawings.

3. Ground each cable runway section to the next. Ground each cable runway system to the nearest telecommunications grounding bus-bar located within the respective telecom rooms. Provide waterfall pieces for the gradual transition from end of cable runway or whenever cables exit the cable runway.

F. Identification:

1. Provide label identification on all outlet faceplates installed under this Work. Labels should be machined-generated labels with the outlet ID as per TIA-606, and approved by the Owner prior to use.

2. Provide on all termination panels installed under this Work, machine-generated designation strips with the cable ID and pair number, in uppercase lettering.

3. Provide on all patch panels installed under this Work, machine-generated label with the cable ID, and fiber strand number in uppercase lettering.

4. Provide on all telecommunications cables installed under this work a machine-generated label with the cable ID, in black uppercase lettering on a permanent adhesive, white label stock, covered with permanent water resistant sealer. Labels shall be placed on both ends of the cable and no more than 6" from the point at which the cable is broken out into individual copper pairs or strands from the connector or termination block or patch panel. Labels shall be placed parallel with the cable. All labels shall be readily visible.

5. Hand lettered label stock will not be accepted for final installation. Hand lettered stock is only acceptable for use with temporary labeling required during construction phases.

6. If at any time during the project, the label becomes illegible or removed, the Contractor shall immediately replace it with a duplicate preprinted label.

7. All cable IDs shall be both physically and visually accessible upon completion of the project.

3.04 COPPER CABLE TESTING AND VERIFICATION

A. Verify and test all Category 6 and 6A cables with a Fluke DTX series Level IIIe tester or newer, that has been properly calibrated by the manufacturer within the prior 12 months. Verification and documentation of latest factory certification must be provided by the Contractor prior to testing.

B. The tester interface adapters shall be PM06 universal permanent link adapters and must be in new condition with the adapter cable and assembly not indicating any twisting or kinking resulting from coiling and storing of the tester interface adapters.

C. Baseline accuracy of the copper test equipment must exceed TIA Level IIIe, as indicated by independent laboratory testing.

D. Copper Test equipment must be capable of verifying Category 3, Category-5e, Category-6 and Category-6A links or channels independent of termination hardware configuration (IDC or 110-style) for levels of performance.

E. Copper Test equipment shall be capable of storing full frequency sweep data for all tests and printing color graphical reports for all swept measurements.

F. The testing device shall be provided by the Trade Contractor and approved by the Designer, and Owner prior to use. It is the responsibility of the Trade Contractor to get written authorization from the Designer and Owner to commence testing with their proposed device. Failure to gain approval is at the Trade Contractor's risk and expense.

G. Category-3 testing of every copper cable pair shall be tested for, and comply with, TIA-568.2-D standards and must include each of the following:

1. Wire Map
2. Length
3. Opens

4. Shorts
5. Continuity
6. Polarity, or Pair Reversals
7. Proper Labeling
8. Others as may be noted in the Contract Documents

H. Category 5e and 6 cables shall be tested for, and comply with, all of the above and TIA-568,2-D standards related to the following:

1. Attenuation/Insertion Loss
2. NEXT (Near End Cross Talk)
3. PS-NEXT (Power Sum Near End Cross Talk)
4. FEXT (Far End Crosstalk)
5. ELFEXT (Equal Level Far End Cross Talk)
6. PS-ELFEXT (Power Sum Equal Level Far End Cross Talk)
7. Propagation Delay
8. Delay Skew
9. Return loss
10. PSFEXT (Power Sum Far End Crosstalk)
11. Attenuation to Cross Talk Ration (ACR)
12. PSACRF (Power Sum Attenuation to Crosstalk Ratio, Far End)

I. Category 6A cables shall be tested for, and comply with, all of the above and TIA-568.2-D standards related to the following:

1. AACRF (Alien Attenuation to Crosstalk Ratio, Far End)
2. AFEXT (Alien Far End Crosstalk)
3. ANEXT (Alien Near End Crosstalk)
4. PSANEXT (Power Sum Alien Near End Crosstalk)
5. PSAACRF (Power Sum Alien Attenuation to Crosstalk Ratio, Far End)

J. Category cables terminated with a Field-installable modular plug shall be tested using the Modified Permanent Testable Link (MPTL) procedures as specified in ANSI/TIA-568.2-D::

1. The MPTL consists of a jack at the patch panel end, and a Field-Terminable Modular Plug a the remote/device end. MPTL links may only be installed upon written instructions from the County.
2. The MPTL shall be tested with a Permanent Link Adapter on the Main Unit and a Patch Cord Adapter Suitable for Category 6A testing on the Far End or Remote Test Equipment

3. The Permanent Link Adapter RJ45 plug must meet the requirements for NEXT, FEXT and Return Loss in accordance with ANSI/TIA-568.2-D Annex C.
4. The Patch Cord Adapter must contain a test jack which meets the requirements for NEXT, FEXT and Return Loss in accordance with ANSI/TIA-568.2-D Annex C
5. Twisted pair Category 5e, 6, 6A, 7 or 7A patch cords are not permitted for testing as their performance degrades with use and can cause false Return Loss failures
6. All test parameters resulting from the MPTL test must comply with all of the above according to the rating of the cable system under test.

3.05 FIBER CABLE TESTING AND VERIFICATION

A. All optical fiber cables/strands must be tested in the end-to-end, completed system with a Fluke Opti-fiber Tier-2 optical fiber testing device and appropriate fiber mandrel that provides the following:

1. Measuring insertion loss
2. Analyzing the OTDR trace
3. Grading the connector end face
4. End face image of connector(s) embedded into certification report.

B. All tested fiber strands must meet the FOTP requirements put forth by TIA/EIA 526, TIA/EIA-455 (method-B), TIA/EIA 492AAAC, TIA/EIA TSB-63, and TIA/EIA TSB-140 requirements and the TIA-568.3 standard. Any optical fibers failing to meet these standards or the more stringent performance requirements stated above, must be removed and replaced, at no cost to the Owner, with fibers that prove, in additional testing, to meet or exceed the performance standards set forth.

C. Optical fiber splices, fusion or mechanical, shall not exceed a maximum optical attenuation stated in section 2, above, when measured in accordance with field testing procedures

D. The system loss measurements shall be provided at 850 and 1310 nanometers for multimode fibers and 1310 and 1550 nanometers for single-mode fibers.

E. The testing of all optical fiber cables shall include bi-directional, end-to-end tests using both a hand-held Optical Time Domain Reflectometer (OTDR) and a light power meter testing device. The signature trace of the cable must include each of the following:

1. Attenuation per kilometer
2. Attenuation uniformity
3. End-to-end integrity
4. Total length of each strand
5. Total insertion light loss
6. Insertion loss at each incident throughout the cable path

F. After Optical fiber verification testing in one (1) direction has been completed and certified, all optical fiber strands are to be measured in the opposite direction. All test parameters shall be indicated for both directions on each strand in the test documentation.

G. All fiber test results shall include an image of both connector end faces embedded into the final test report (hard and soft copy) for a baseline reference of each connector.

H. The allowable loss budges shall be as follows:

1. MMF: (All cable loss per km) x (km of fiber in link) + (0.30dB LOMMF) x (number of connectors) = maximum allowable loss
2. Loss numbers for the installed link shall be calculated by taking the sum of the bi-directional measurements and dividing that sum by two.
3. Any link not meeting the requirements of the standard shall be brought into compliance by the contractor at no charge to the Owner.

I. Any installed component in the TIA/EIA fiber-related and/or industry standard verifications testing parameters found to be below performance standards for that particular channel and/or link, testing procedure, and manufacturer specified performance criteria shall be immediately replaced and retested by the Trade Contractor at no additional cost to the Owner until all deficiencies are rectified to the satisfaction off all testing procedures.

3.06 TEST DOCUMENTATION

A. A complete set of test results shall be presented to the Designer and Owner at least one (1) week before the placement of active electronics in the IT spaces. The Trade Contractor shall identify the types of cable tester(s) used during the testing and verification when presenting the results for each type of cable and each test procedure, unless otherwise indicated.

B. All verification and test results shall be submitted to the Designer and Owner in both paper and electronic formats printed directly from the testing device software application. Paper results must be neatly presented in a three (3) ring binder and

sectioned according to floor and cable type, OSP, Category-6A, Category-6, (and Category-5e, Category-3 if appropriate), and optical fiber cables must be divided into separate sections with each floor. Electronic results must be presented on CD-ROM disc(s) in the testing device's native file type with a copy of the electronic software used to generate the test results for review by the Owner, Designer and the contractor selected connectivity and cable group representative(s).

C. Trade Contractor shall warrant in writing that one hundred percent (100%) of the installation meets requirements specified under subsections above. Owner reserves the right to conduct, using Trade Contractor equipment and /or labor, a random re-test of up to five (5) percent of the cable plant to confirm documents results. Complete (100%) random re-testing, if performed, shall be at the expense of the Owner, using standard labor rates if no failures are found. If any failures are found in the 5% verification testing performed by the Owner, the re-testing expense shall be the Trade Contractor's. Any failing cabling shall be re-tested and restored to a passing condition. In the event more than two percent (2%) of the cable plant fails during re-test, the entire cable plant shall be re-tested and restored to a passing condition at no additional cost to the Owner.

3.07 FIRE STOP – PENETRATION SEALANT

A. Provide fire-resistant materials of a type and composition necessary to restore fire ratings to all wall or floor ceiling penetrations. Material must be properly classified and meet all national and local codes.

B. All penetrations through fire rated floors and walls shall be sealed to prevent the passage of cold smoke, fire, toxic gas or water through the penetrations, before, during or after a fire. The fire rating of the penetration seal shall be at least that of the floor or wall into which it is installed, so that the original fire rating of the floor or wall is maintained as required by Article 300-21 of the National Electrical Code.

C. No flammable material may be used to line the chase or hole in which the firestop material is to be installed.

D. All damming materials to be left in place after the seal is complete shall be non-flammable.

E. The sealant shall remain resilient and pliable to allow the removal and or addition of cable without necessity of drilling holes. It shall adhere to itself perfectly to allow any and all repairs to be made with the same material. It shall allow for

vibration, expansion and/or contraction of anything passing through the penetration without affecting the seal, or cracking, crumbling and spalling.

F. When sealant is injected into a penetration, the material shall expand to surround all the items within the penetration and maintain pressure against the walls of the penetration as well as the pass-through items. The material shall cure within five minutes and be fire resistant at that time. No heat shall be required to further expand the material to prevent the passage of fire and smoke or water.

G. The materials shall have been subjected to fire exposure in accordance with standard time-temperature curve in the Standard, UL ASTM E 119 and NFPA 251. The fire stop material shall have also been subjected to the hose stream test in accordance with UL 10B.

3.08 AS BUILT DRAWINGS AND CABLE LIST

A. The Contractor shall provide the following "As-Built" drawings to the owner. These as-built drawings shall include all work described within this specification section, including, but not limited to the following:

1. A complete backbone connectivity diagram showing backbone interconnection and cable routing. Each cable type and routing shall be noted.
2. Finalized, detailed elevations of the Voice and Data MDF illustrating all punch-down locations and rack elevations.
3. Finalized, detailed elevations of the IDF(s) illustrating punch-down locations and equipment rack locations
4. Finalized equipment rack elevations illustrating vertical location of termination hardware (e.g. fiber boxes, patch panels, etc.) within all telecommunications areas.
5. Finalized outlet layout floor plans including room/area numbers, outlet numbers and the corresponding cable identification numbers.

3.09 MANUFACTURER'S LITERATURE

A. Where the Specifications and/or Project Drawings call for an installation to be made in accordance with the Manufacturer's recommendations, a copy of such recommendations shall always be kept on the job site, and shall be available to the Owner.

B. Contractor shall follow manufacturer's instructions where they cover points not specifically indicated on Project Drawings and Specifications. If said instructions differ from the Project Drawings and Specifications, it is the responsibility of the

Contractor to obtain clarification from the Owner in writing before commencing work.

3.10 TRAINING

A. Provide training for the Owner-appointed employees to operate and maintain the installed technology utility system. Training will include two (2) full day sessions that include, but are not limited to: a description of the system, a tour of the facilities, and a manufacturer-provided tutorial on using the cable testers and documentation software.

3.11 ACCEPTANCE

A. The installation will not be accepted until all work is complete and properly documented, as noted above and in the Project Drawings and not until all punch list items discovered are completed to the Owner's satisfaction and after the successful completion of the Acceptance period.

B. Following the completion and compliance of all requirements noted above and in Division One, the Owner will issue a Notice of Completion confirming that the Technology Portion of the project is complete. A forty-five (45) day Acceptance period will begin immediately following the issuance of this Notice of Completion

C. During the acceptance period, the Voice Data Communication System, as described herein and in the Project Drawings, must be up and operational. If there is a major system failure, the Acceptance period will begin again, once the failure is resolved and the system is back up and running. Major system failures are defined as failures that impact 10% or more of the user connections.

D. This Acceptance period shall be considered outside any Warranty period provided by the Contractor or Manufacturer. Once the forty-five (45) days Acceptance period has successfully passed, the Warranty period shall begin.

E. The project manager must be available to answer questions about the installation and to attend site visits and meetings during the acceptance period, as deemed necessary by the Owner.

F. Contractor shall submit all applications for Manufacturer extended warranty on behalf of Owner before completion of the Acceptance Period.

--------- END --------

APPENDIX A

GEOTECHNICAL INVESTIGATION

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GEOTECHNICAL ENGINEERING INVESTIGATION AND
GEOLOGIC HAZARDS EVALUATION
NEW EAST GARRISON COUNTY BRANCH LIBRARY FEASIBILITY
13993 SHERMAN BOULEVARD
EAST GARRISON, CALIFORNIA

January 29, 2024

Prepared for:

Mr. Andrei Petrutiu
Monterey County Public Works, Facilities, and Parks

Prepared by:

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Salinas, CA 93905

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January 29, 2024 File No.: 306389-001

Mr. Andrei Petrutiu
Monterey County Public Works, Facilities, and Parks
1441 Schilling Place, South 2nd Floor
Salinas, CA 93901

PROJECT: NEW EAST GARRISON COUNTY BRANCH LIBRARY FEASIBILITY
13993 SHERMAN BOULEVARD
EAST GARRISON, CALIFORNIA

SUBJECT: Geotechnical Engineering Investigation and Geologic Hazards Evaluation

REF.: Proposal for a Geotechnical Engineering Investigation and a Geologic Hazards Evaluation Report, New East Garrison County Branch Library Feasibility, 13993 Sherman Boulevard, East Garrison, California, by Earth Systems Pacific, dated October 6, 2023

Dear Mr. Petrutiu:

Per your authorization, Earth Systems Pacific has prepared this geotechnical engineering and geologic hazards report for use in development of plans and specifications for the new East Garrison County Branch Library to be constructed at 13993 Sherman Boulevard, in the East Garrison area of Marina. This report has been prepared to comply with provisions of the 2022 California Building Code. The general site geologic/seismic characteristics are described herein, and potential geologic/seismic hazards have been identified and addressed. Preliminary geotechnical recommendations for site preparation and grading, building foundations, at-grade concrete floor slabs, exterior flatwork, backfilling of utility trenches, post construction maintenance of site drainage, and required observation and testing are also presented herein.

We appreciate the opportunity to have provided services for this project and look forward to working with you in the future. If there are any questions concerning this report, please do not hesitate to contact the undersigned.

Sincerely,

Earth Systems Pacific

Ajay Singh, GE 3057
Principal Engineer

John Feltman, CEG 2530
Senior Geologist

Doc No.: 2401-015.SGR/mg

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1.0 INTRODUCTION AND SITE SETTING

The project site is located at 13993 Sherman Boulevard, at the intersection of East Garrison Drive and Sherman Boulevard, in the East Garrison area of Marina. The site is currently undeveloped and consists of two graded pads with an approximate 3-foot-high slope between them. Elevations range from approximately 160 feet on the northwest to approximately 155 feet on the southeast, based on a review of the topographical map of the site provided by Monterey County. The planned building area is approximately centered at 36.654928 degrees north latitude and -121.733358 degrees west longitude on the U.S. Geological Survey's Seaside 7.5-minute quadrangle. The Salinas River is located about 0.7 mile to the northeast. The site location is shown on a Vicinity Map (Figure 1).

Site development plans were not available for review at the time of this report, but based on discussions with the County, it is our understanding that the planned development will include placement of fill on the lower pad to create one pad for the library with a finished floor elevation of 160 feet. Additional development includes the construction of a parking lot in the upper pad on the western portion of the site with a ramp leading to the proposed library. Plans for the potential library building and associated structural loads were not available at the time this report was prepared but we anticipate that the building will be a one-story structure and that the loads will be typical of a light frame building. Based on a review of the planned development, we anticipate the grading to be moderate with cuts and fills of approximately three feet.

2.0 SCOPE OF SERVICES

The scope of work for this report included: 1) a site reconnaissance by a geologist, 2) exploration of subsurface conditions from a geotechnical engineering standpoint, 3) laboratory testing of soil samples collected from the site to measure pertinent geotechnical engineering properties, 4) engineering analysis of the geotechnical and geologic data, and 5) preparation of this report.

This report and preliminary geotechnical recommendations are intended to comply with the following: the considerations of Sections 1803A.1 through 1803A.7 and J104.3 of the 2022 California Building Code (CBC); California Geological Survey Note 48 (CGS 2022); and common geotechnical engineering and engineering geology practice in this area under similar conditions at this time. The tests were performed in general conformance with the standards noted, as modified by common geotechnical engineering practice in this area under similar conditions at this time.

Preliminary geotechnical recommendations for site preparation and grading, utility trenches, foundations, slabs-on-grade and exterior flatwork, drainage and maintenance, and geotechnical observation and testing are presented to guide the development of project plans and specifications. It is our intent that this report be used exclusively by the client in the preparation of plans and specifications.

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 means and methods, etc. Analyses of the soil for mold potential, asbestos in building materials, lead, radioisotopes, hydrocarbons, or chemical properties other than geotechnical corrosivity are beyond the scope of this report. Evaluation of the site for suitability for drainage basins, if added, is beyond the scope of this report. Ancillary features such as temporary access roads, fences, flag and light poles, signage; and nonstructural fills are not within our scope and are also not addressed.

As there may be unresolved geotechnical or geologic issues with respect to this project, the geotechnical engineer and engineering geologist should be retained to provide consultation as the design progresses, to review project plans as they near completion, to assist in verifying that pertinent geotechnical issues have been addressed, and to aid in conformance with the intent of this report. In the event 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 in this report shall not be considered valid unless the changes are reviewed, and the conclusions of this report are verified or are modified in writing. 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 are observed by the geotechnical engineer and/or engineering geologist in the field during construction, and the recommendations have been verified as appropriate or modified in writing.

3.0 FIELD INVESTIGATION

On October 19, 2023, two exploratory borings were drilled at the site using a truck-mounted B-24 drill rig equipped with a 7-inch outside diameter hollow-stem auger. The approximate locations of the borings are shown on the Site Geologic and Boring Location Map (Figure 2).

Boring 1 was drilled within the proposed building footprint to a depth of approximately 50 feet below ground surface (bgs). Boring 2, located in the northwest portion of the site (proposed parking lot), was drilled to a depth of 20 feet bgs. Soil samples were obtained from the borings using an internally-lined barrel sampler (ASTM D 3550-17, with shoe similar to D 2937-17), Standard Penetration Tests – SPT (ASTM D 1586-18) were conducted at selected depths, and bulk soil samples were obtained from the auger cuttings.

Soils encountered in the borings were logged in general accordance with the Unified Soil Classification System and ASTM D 2488-17 and based on the observations, similar soils were lumped to create soil layers and generate a soil profile. Copies of the boring logs and a boring log legend are included in Appendix A. In reviewing the boring logs and legend, the reader should recognize that the legend is intended as a guideline only and there are a number of conditions that may influence the soil characteristics as observed during drilling. These include, but are not limited to, the presence of cobbles, cementation, variations in soil moisture, presence of groundwater, and other factors.

Subsequently, on October 31, 2023, four cone penetrometer tests (CPT) were performed on the site. Refusal conditions were encountered in CPT-1, CPT-2, and CPT-4 at depths of 14 to 20 feet. Additional CPTs were performed adjacent to CPT-1 and CPT-2 in an attempt to reach a depth of 50 feet bgs. The three additional CPTs (CPT-1A, CPT-1B, and CPT-2A) were unsuccessful in their attempt to reach 50 feet bgs, with refusal conditions encountered between 15 to 20 feet bgs. CPT-3 was successfully advanced to a depth of 50 feet bgs. The approximate locations of the CPT soundings are shown on the Site Geologic and Boring Location Map (Figure 2).

The CPT soundings were performed by Middle Earth Geo Testing, Inc. (MEGT) using a 25-ton truck mounted CPT rig. The soundings were conducted in accordance with ASTM specifications. Copies of the CPT logs are included in Appendix A.

A CPT involves pushing a standardized size instrument of a conical shape into the ground at a specified constant rate. The cone used for this project had a tip area of 15 cm^2 and a friction sleeve area of 225 cm^2. The cone was pushed into ground at a constant rate of approximately 20-mm per second using the 25-ton truck as reaction weight. The cone was fitted with load cells,

which continuously recorded the total force acting on the cone (Qc), sleeve friction (Fs), and pore pressure (u) readings. The data collected from the CPT was processed to interpret site stratigraphy and many other engineering properties of soil using published relationships. Generally, cohesive soils (clays) have high friction ratios (sleeve friction divided by cone bearing – Rf), low cone bearing, and generate large excess pore water pressures. Cohesionless soils (sands) have lower friction ratios, high cone bearing, and generate little in the way of excess pore water pressures.

4.0 LABORATORY ANALYSIS

The near surface soils encountered at the site were found to be clean poorly graded sands to clayey/silty sands extending to the bottom of borings, up to 50 feet below ground surface. Near surface sandy soils were judged to be non-expansive.

A sample of the near surface soil from Boring 1 was tested by CERCO Analytical to measure Redox Potential, pH, resistivity, chloride and sulfate concentrations. These parameters were used to evaluate corrosion potential of near surface soils at the site. A description of their test methods, results and a brief evaluation of the test results are contained in the Corrosivity Analysis in Appendix B.

5.0 GENERAL SUBSURFACE PROFILE

The near surface soils within the proposed building area are classified as non-expansive, poorly graded sands, clayey sands, and silty sands, based on CPT data and laboratory results from soils collected from Borings 1 and 2. Based on the results of the CPTs and exploratory borings, soil stratigraphy generally consists of dense to very dense, poorly-graded sands and silty to clayey sands to the maximum depth explored (50 feet below ground surface). The sands encountered in our borings and CPTs are consistent with the older dune deposits mapped at the site (See Section 7.0 “Geology”, below). The sands encountered in our borings and CPTs are generally uniform across the site, as shown on Cross Section A-A’ (Figure 4a) and Cross Section B-B’ (Figure 4b).

Based on the results of our subsurface exploration data, it is our opinion that the Site Class per Table 20.3-1 of ASCE 7 (per Section 1613A.3.2 of the 2022 CBC) is taken as “D – Stiff Soil” Profile.

6.0 GROUNDWATER

Subsurface water was not encountered in the seven CPTs or the two borings advanced at the site. We reviewed the California Department of Water Resources website for nearby well data. State well number PZ-FO-32-0-910 (Local Well Name), an observation well located approximately 3,050 feet northwest of the site, shows groundwater level has fluctuated between 267.11 and 234.11 feet bgs during the timeframe available (2020 to 2023). This observation well is located on the same geologic unit (Qod) as the subject site, at a slightly higher elevation of 189.61 feet. A well completion report for State Well No. 155S02E03-00070801, a domestic water well located approximately 1,000 feet northwest of the site, records a depth to groundwater of approximately 230 feet bgs in September 1971. This well is located on the same geologic unit (Qod) as the subject site, at a slightly higher elevation of approximately 200 feet. We also reviewed the DTSC Envirostor website for nearby wells and did not find any. Based on the above information, we consider the historical high groundwater level at the site to be greater than 50 feet below ground surface, the maximum depth explored.

7.0 GEOLOGY

Geologic Setting

The site is located in the seismically active central California Coast Ranges geomorphic province and is situated on the west side of the Salinas Valley east of Monterey Bay. At the latitude of the site, the valley is bounded by the Gabilan Range on the east, the Sierra de Salinas Range (a sub-range of the Santa Lucia Range) to the south, and low-lying hills between the Salinas River and Monterey Bay. The Salinas River is located approximately 0.7 miles northeast of the site at the valley margin and flows northwest toward its mouth at the Pacific Ocean. The site is located on a plateau underlain by Pleistocene dune sands approximately 120 feet higher than the flood plain of the Salinas Valley to the northeast. The edge of the plateau forms a northeast-facing bluff approximately 520 feet northeast of the site. The concealed trace of the northwest-trending Reliz fault is mapped by Monterey County adjacent to the Site to the southwest. The northwest-trending San Andreas fault is located on the east side of the Gabilan Range approximately 17.1 miles northeast of the site.

Based on mapping by Dupre and Tinsley (1980), the site is underlain by older dune deposits (Qod2), described as weakly consolidated, well-sorted sand of eolian origin. Wagner and others (2002) map the site on older dune sand (Qod; see Figure 3 Local Geologic Map). Site geologic conditions are shown on the Site Geologic and Boring Location Map (Figure 2), and on Geologic Cross Sections A-A' and B-B' (Figures 4a and 4b). Dupre and Tinsley map the site as having "low liquefaction susceptibility".

Faulting

The subject site is located within the seismically active Monterey Bay region. Several active and potentially active faults have been identified in this region. Until recently, faults were historically described by the California Geological Survey (CGS) as "active" and "potentially active". As of 2018 (CGS, 2018), the CGS no longer uses the terms "Active" and "Potentially active" to describe faults. Faults are now described as "Holocene-active" for faults having activity within the last 11,700 years; "Pre-Holocene" for faults which have not been active within the last 11,700 years (Pre-Holocene faults may still have potential for rupture but are not regulated by the Alquist-Priolo Act); and "Age-undetermined" is used for faults where timing of last rupture is unknown. However, within Alquist-Priolo Earthquake Fault Zones age undetermined faults are considered active unless data can be obtained to demonstrate otherwise.

There are no known faults that cross the site, and the site is not located in a State Earthquake (Alquist-Priolo) Fault Zone (Jennings and Bryant, 2010; CGS 2018). The closest Holocene-active fault to the site is the San Andreas fault, located approximately 17.1 miles northeast (Figure 6). The closest fault to the site is the pre-Holocene Rinconada-Reliz fault (Reliz fault), mapped by Jennings and Bryant (2010) at a scale of 1:750,000 as passing through the East Garrison area on a northwest-southeast trend, and ending at the Pacific Ocean at Marina. Monterey County maps the fault as passing the site close-by on the adjacent parcel across Sherman Boulevard to the southwest at its closest approach (approximately 100 feet southwest of the edge of the site; Figure 5a). The County maps the fault as concealed and queried, indicating its presence and location to be uncertain. The fault is not mapped by authors of published geologic mapping in the vicinity of the site (Dibblee and Minch, 2007; Wagner and others, 2002; Dupre and Tinsley, 1980). Based on trenching by Terratech, Inc. (1989) at the Las Palmas Ranch property along the range front of the Sierra De Salinas to the southeast, the fault does not offset late Pleistocene soils (see detailed description below). As such, it is likely that the fault, if present, is concealed

by the Pleistocene older dune sand deposits mapped at site. UCERF3 maps the Reliz fault approximately 0.5 miles to the *northeast* of the site. Faults of the Monterey Bay-Tularcitos fault system are located as close as 8.8 miles to the southwest of the site, however the age of faulting on these faults is poorly understood. The pre-Holocene Zayante-Vergeles fault is located approximately 12.9 miles northeast of the site. The locations of these and other faults of the San Andreas fault system relative to the site are shown on a Regional Faults and Earthquakes map (Figure 6). The earthquake locations are keyed to the Selected Earthquakes table (Figure 7).

A brief discussion of characteristics for nearby faults is provided below.

Rinconada/Reliz fault

The Rinconada/Reliz fault is mapped approximately 100 feet southwest of the site by Monterey County and 0.5 miles to the northeast of the site by UCERF3. It is a high-angle reverse fault, which offsets Salinian block crystalline basement rocks and locally juxtaposes Pliocene-Pleistocene age Paso Robles Formation against basement rocks. Most of the offset on this fault appears to have been reverse dip-slip with Sierra de Salinas and Salinian basement uplifted to the southwest by as much as 3,000 m. Terratech, Inc. (1989) excavated five trenches across the fault on the Las Palmas Ranch property. Trenches TR-1, 2, and 4 exposed a 4.5-m-wide fault zone which displaces a duripan (estimated age several tens of thousands to a few hundred thousand years old) within the Pliocene-Pleistocene Paso Robles Formation, but does not offset late Pleistocene colluvium (estimated age of 30-50 ka). Vertical uplift rates derived from marine terrace profiles on western side of Santa Lucia Range suggest a late Quaternary slip rate of about 0.16 mm/yr (USGS, 2017). UCERF3 estimates a 0.3% chance of an earthquake with a magnitude of 6.7 or higher on this fault system for the period of 2014 to 2044 on this fault.

San Andreas fault

The San Andreas fault is approximately 17.1 miles northeast of the site. The San Andreas fault trends northwest and southeast throughout northern and southern California. The San Andreas fault is dominantly a strike-slip fault which is located at the boundary between the Pacific Plate to the west and the North American Plate to the east. Several large earthquakes (greater than 5.9 magnitude) have occurred along the northern segment of the San Andreas fault in the last 200 years (e.g. 1836, 1838, 1906, and 1989). A 6.9 (Mw) magnitude earthquake (Loma Prieta) occurred on this fault on October 17, 1989, and produced a Modified Mercalli Intensity of VII in the Salinas area (USGS, 2017).

Monterey Bay-Tularcitos Fault System

The Monterey Bay-Tularcitos fault zone is a complex, generally northwest-striking zone up to 12.6 km wide of dextral, dextral-reverse, and thrust faults, located partially offshore, approximately 8.8 miles southwest of the subject site. Due to its offshore location, the Monterey Bay-Tularcitos fault zone lacks detailed studies and evidence of late Pleistocene and Holocene slip rates is poorly constrained. Dextral slip rates are not known. UCERF3 estimates a 1.4% chance of an earthquake with a magnitude of 6.7 or higher on this fault system for the period of 2014 to 2044.

Zayante-Vergeles fault

The Zayante-Vergeles fault trends northwest through the Monterey Bay area and is a major dextral reverse-oblique-slip fault with late Pleistocene and possible Holocene displacement. The fault is located approximately 12.9 miles northeast of the site. Detailed reconnaissance-level geologic and geomorphic mapping has been conducted for the fault zone and identified latest Pleistocene and possible Holocene vertical displacement and estimated a vertical slip rate of 0.2 mm/yr. for the fault. This slip rate seems to have been relatively constant throughout Cenozoic time and is estimated to have a late Quaternary net slip rate of between 0.03 mm/yr. and 1.4 mm/yr. This fault has an estimated earthquake recurrence interval of 3,130 years based on an assumed 7.1 earthquake magnitude. We are not aware of significant historic earthquakes attributable to the Zayante-Vergeles fault.

San Gregorio fault

The San Gregorio fault is a Holocene active, structurally complex transpressional fault zone as much as 5 km wide, approximately 17.2 miles southwest of the site. The fault zone is mainly located offshore, west of San Francisco Bay and Monterey Bay, with onshore locations at promontories, such as Moss Beach, Pillar Point, Pescadero Point, and Point Ano Nuevo. A component of west-vergent reverse displacement also characterizes the fault zone. The most recent earthquake along the San Gregorio fault zone occurred after 1270 to 1400, but prior to the arrival of Spanish missionaries in 1775. UCERF3 estimates an approximate 2.9% chance of an earthquake with a magnitude of 6.7 or higher on this fault for the period of 2014 to 2044.

Aerial Imagery

We reviewed images available on Google Earth dated between 1985 and 2023. The library site was part of the East Garrison of Fort Ord, which has recently been redeveloped. As recently as 2006, the library site was vacant land with scrub brush and oak trees. Mass grading for new development is evident in 2007 photographs. There are no obvious lineaments that would suggest the presence of faulting that passes through or are on trend with the site. Additionally, there was no evidence of landslides on or adjacent to the site.

8.0 SEISMICITY

Earthquake History

The historic earthquakes in the site region were researched using the Northern California Earthquake Data Center Catalogs (NCEDC 2014, accessed 2022). The parameters used for the search consisted of earthquake Richter magnitudes ranging from 5.0 to 9.0 that occurred within a 65-mile radius from the site from 1910 to 2020.

The results of the search indicated that within the search parameters, 41 earthquakes have occurred. Some of the nearby earthquakes are shown on the Regional Fault and Earthquakes Map (Figure 6). The largest earthquake had a 6.9 magnitude and occurred in 1989 (Loma Prieta earthquake). It was estimated to be located approximately 27.6 miles north-northwest of the site. The nearest large magnitude (5.37) earthquake occurred in 1998 and was located approximately 15.4 miles to the northeast near Fremont Peak.

Ground Motion Analyses

In accordance with CGS Note 48 (2022), 2022 CBC and ASCE 7-16 (2017, 2018, 2021), an assessment was made to determine the need for employing "Site-Specific Ground Motion Procedures" to calculate the ground motion parameters for the project. Based on our site evaluation, the subsurface characteristics are those of Seismic Site Class D (Stiff Soil) as defined by ASCE 7-16 Table 20.3-1, Site Classification, based on Standard Penetration Tests (SPT) and cone penetrometer tests (CPT). The mapped S_1 ground motion value obtained from the Structural Engineers Association of California website (SEAOC, 2024) using the ASCE 7-16 (2017), for Site Class "D - Stiff Soil," was 0.537g, greater than 0.2; therefore, per Section 11.4.8 of ASCE 7-16, the project requires site-specific ground motion analyses unless certain procedures are

used during the structural design that comply with the exceptions allowed. Because we have no information on the building's fundamental period, or if the structural engineer intends to use the calculations necessary to comply with an exception, we performed a site-specific ground motion analysis to develop the seismic design parameters in accordance with ASCE 7-16 Sections 11.4.8 and 21.2.

A risk-targeted maximum considered earthquake (MCE_R) modeling procedure was performed in accordance with ASCE 7-16, including a Probabilistic Seismic Hazard Analysis (PSHA) using ground motion data from the United States Geologic Survey (USGS, 2024) Earthquake Hazard Toolbox based on the National Seismic Hazard Model (NSHM) Conterminous U.S. 2018, and a Deterministic Seismic Hazard Analysis (DSHA) using the Third California Earthquake Rupture Forecast (UCERF3) fault model (USGS 2013) and NGA-West2 ground motion prediction equations (PEER 2015). These analyses are based on knowledge of the regional tectonic setting, geology, and seismicity. These analyses were performed as described in ASCE 7-16 Section 21.2.1.1 (Method 1) to estimate the peak ground motion corresponding to the uniform hazards earthquake and MCE_R which has a 2% probability of being exceeded in 50 years.

Our DSHA analysis assessed the ground response resulting from a magnitude 7.44 earthquake on the Reliz fault modeled 0.5 miles from the site and hanging wall conditions. The fault parameters that we considered in our analysis are presented in Table C-1, Fault Parameters, in Appendix C, modified in accordance with the USGS Earthquake Scenario website (BSSC 2014). The primary seismic risks at the site are from earthquakes generated by the Reliz, Monterey Bay-Tularcitos, Zayante-Vergeles, and San Andreas faults. Although these listed faults are thought to potentially generate the most severe seismic shaking at the site any local fault could produce seismic shaking.

The 2022 CBC seismic design criteria are based on a Design Earthquake that produces ground motion $^2/_3$ of the lesser of an earthquake with 2 percent probability of occurrence in 50 years, or maximum 84th percentile of the mean deterministic MCE. The deterministic spectra calculated with NGA-West2 ground motion prediction equations are presented in Table C-2.

Seismic Design Category

Section 1613A.2.5 of the 2022 CBC states that *structures classified as Risk Category I, II or III that are located where the mapped spectral response acceleration parameter at 1-second period, S_1, is greater than or equal to 0.75 shall be assigned to Seismic Design Category E… Other structures shall be assigned to Design Category D*. The mapped S_1 for the site is 0.537, less than 0.75; therefore, the site should be assigned to the seismic design category D.

Seismic Design Parameters

This site may be subject to strong ground shaking due to potential fault movements along regional faults including the Reliz fault, whose proximity and magnitude potential was considered during our site-specific analysis. Engineered design and earthquake-resistant construction increase safety and allow development of seismically active areas. The minimum seismic design should comply with the 2022 edition of the CBC and ASCE 7-16. The resulting seismic coefficients considering Seismic Site Class D are summarized in Table 1 below. The results of our site-specific ground motion analysis are presented in Table C-3. The S_a values presented in column 8 of Table C-3 may be used with the equivalent lateral force (ELF) procedure in accordance with Section 21.4 of ASCE 7-16 (2017).

TABLE 1: SITE SPECIFIC SEISMIC PARAMETERS
(2022 CBC/ASCE 7-16) (Method 1)

Seismic Design Category	D
Seismic Site Class	D
Mapped and Code Based Ground Motion	
Short Period Spectral Response, S_s	1.509 g
1 second mapped Spectral Response, S_1	0.537 g
Design Earthquake Ground Motion	
Short Period Spectral Response, S_{DS}	1.261 g
1 second Spectral Response, S_{D1}	1.071 g
Peak Ground Acceleration (PGA_M)	0.736 g
MCE Spectral Response Acceleration	
Short Period Spectral Response, S_{MS}	1.892 g
1 Second Period Spectral Response, S_{M1}	1.606 g
Site Amplification Factors	
Short Period Site Coefficient, F_a	1.00
1 Second Period Site Coefficient, F_v	2.50
Vertical Site Coefficient, C_v	1.40
Risk Coefficient (Short Period), C_{Rs}	0.962
Risk Coefficient (1 Second Period), C_{R1}	0.941

Acceleration values provided are estimates only. Vertical accelerations are typically ⅓ to ⅔ of the horizontal accelerations but can equal or exceed the horizontal accelerations depending upon the fault type, local site effects and amplification.

9.0 GEOLOGIC 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 in a State Earthquake Fault Zone, and there are no mapped faults crossing the site. While the concealed and queried trace of the pre-Holocene Reliz fault is mapped adjacent to the site by Monterey County, it is likely concealed by Pleistocene older dune sand deposits, if present. Therefore, the potential for surface ground rupture to occur within the site is considered to be low.

Liquefaction & Dry Sand Settlement

Soil liquefaction is a phenomenon where saturated granular soils undergo a substantial loss of strength due to increased pore water pressure resulting from cyclic stress applications induced by earthquakes or other vibrations. In this process, the soil acquires mobility sufficient to permit both vertical and horizontal movements, which may result in significant deformations. Soils most susceptible to liquefaction are loose, uniformly graded, fine-grained sands. In addition, recent literature indicates that fine grained soils may also be susceptible to liquefaction or cyclic strain softening. Examples of highly susceptible fine-grained soil include "non-plastic silts and clayey silts of low plasticity (PI<12) at high water content to liquid limit ratios (w_c/LL>0.85)." Examples of soils moderately susceptible to liquefaction include "clayey silts and silty clays of moderate plasticity (12<PI<18) at natural water content and Liquid Limits ratios (w_c/LL) greater than 0.80" (Bray and Sancio, 2006). It is generally acknowledged that liquefaction will not affect surface improvements if these deposits are located at a depth greater than 50 feet below the ground surface. In the deeper deposits, the greater overburden pressure is sufficient to prevent liquefaction effects from occurring.

Based on mapping by Dupre and Tinsley (1980), the site is underlain by older dune deposits (Qod2), described as weakly consolidated, well-sorted sand of eolian origin. Wagner and others (2002) map the site on older dune sand (Qod; see Figure 3 Local Geologic Map). Dupre and Tinsley (1980) map the site as having "low" liquefaction susceptibility. Likewise, according to the Monterey County Geologic Hazard Zones web application accessed online, the site lies within an area of low liquefaction susceptibility (Figure 5b). We performed engineering analysis to estimate seismic settlements at the site. Details of our analysis are presented below.

Analysis

In order to evaluate liquefaction potential and estimate seismic settlement at the site, ESP performed engineering analyses using the subsurface data collected from the CPTs performed at the site. The CPT data was analyzed with the aid of computer program CLiq V.3.3.1.14 by Geologismiki using various methods including Boulanger and Idriss, 2014; Moss et al, 2006, Idriss and Boulanger, 2008, Robertson, 2009, and Robertson (NCEER, 2001).

The analyses used the following input parameters:

- Depth to groundwater - greater than 50 feet,
- Subsurface data from the CPT's,
- Modified peak ground acceleration (PGA_M) - 0.74g (calculated in accordance with CBC 18.03A.5.12 (general procedure); and
- Moment magnitude - 7.44, consistent with the mean characteristic moment magnitude for the Reliz fault.

Seismic settlement of approximately ½-inch was estimated in the planned building area. The results of our liquefaction analysis are presented in Appendix D. The differential settlement was estimated to be approximately ¼-inch. The estimated total and differential liquefaction-induced settlements, additionally discussed in the geotechnical Recommendations sections of this report, should be considered in the design of foundations and other improvements.

As noted above, soils encountered in the CPTs were sand layers. Based on this finding, and the relatively low seismically induced settlement estimated for the site (approximately ½-inch), we judge that surface manifestation of liquefaction, such as sand boils, is unlikely at the site.

Lateral Spreading

The nearest embankment is a northeast-facing slope descending to the southwest edge of the Salinas River flood plain, located approximately 520 feet northeast of the site. These slopes are located sufficiently far from the project site that the potential for lateral displacement at the site is considered low (approximately ⅛-inch).

Slope Stability and Seismically Induced Landsliding

The ground surface at the site is essentially flat. There was no evidence of potential instability on or adjacent to the site. Therefore, the potential for slope instability and seismically induced landsliding to occur on-site are considered to be low.

Tsunami and Seiche Potential

Hazardous tsunamis along the California coastline can be caused by vertical displacement of submarine faults, or by submarine landslides. The site is approximately 4.8 miles from the Pacific Ocean, and according to the CGS Tsunami Hazard Area Map for Monterey County (2009) the site area lies outside tsunami hazard areas. The potential for the site to be affected by a tsunami event is considered to be low.

A seiche is a single water wave that can be generated in a reservoir, lake or pond as the result of long-period surface waves normally generated by strong local earthquakes or larger earthquakes at farther distances. As there are no reservoirs, lakes or ponds in the vicinity of the site, the potential for a seiche to affect the project site is considered to be nil.

Flooding

According to Flood Insurance Rate, Map Number 06053C0215G dated April 2, 2009, published by the Federal Emergency Management Agency (FEMA), the entire site lies within a 0.2% Annual Chance Flood Hazard Area (Zone X). See FEMA Flood Zone Map (Figure 8).

Naturally Occurring Asbestos

The site is underlain by sand dune deposits. Because there are no asbestos-bearing rock formations (serpentinite or ultramafic rock) on or mapped within 10 km (Churchill and Hill, 2000) of the site, the potential to encounter naturally occurring asbestos during construction is considered to be low.

Radon

Radon is a colorless, odorless gas present in soil and rock, which is derived from the decay of uranium. The occurrence of radon correlates with the presence of specific minerals, and its concentrations in soil or rock will vary depending on the mineralogy of the surrounding bedrock, temperature, barometric pressure, moisture and other factors.

Radon in the central coast areas of California is most commonly found in areas that are underlain by bedrock of the Rincon and Monterey Formations, or soils derived from these formations.

According to the California Geological Survey's Indoor Radon Potential Zones map for Monterey County (CGS Special Report 201, accessed online), the site is located within an area of low potential for indoor radon levels above 4 pCi/L, the lowest rating mapped. The California Department of Health Services recommends that action be taken to reduce indoor radon levels if it is 4 pCi/L or greater. It is our opinion that the potential for indoor radon levels exceeding 4 pCi/L at the site is low.

10.0 CONCLUSIONS

In our opinion, the site is suitable, from a geotechnical engineering and engineering geologic standpoint, for the proposed East Garrison Branch Library building as described in the "Introduction and Site Setting" section of this report. The primary geologic hazard is the potential for strong seismic ground shaking. All other geologic hazards are considered to have low to nil potentials for occurrence. The new building should be designed based on the design criteria presented in Section 8.0 of this report.

The near surface soils within the building area are sandy soils with low plasticity, indicating the soils have low expansion potentials. Thus, measures other than moistening and compacting the soils are not considered necessary to mitigate soil expansion.

A review of the subsurface data from the borings and CPTs indicate that the near surface soils are very dense. Based on the review of the subsurface data from the randomly placed exploration locations, it is our opinion that the fill material previously placed at the site does not need to be excavated and placed back as compacted fill even though we don't have any records related to fill placement and compaction available for review.

The results of tests performed on the soil sample submitted to Cerco Analytical Laboratory indicate that based on resistivity results the near surface soil is mildly corrosive; therefore, all buried iron, steel, cast iron, ductile iron, galvanized steel and dielectric coated steel and iron should be protected against corrosion depending on the critical nature of the structure. All

buried metallic pressure piping such as ductile iron firewater pipelines should be protected against corrosion. The chloride concentration was found to be insufficient to attack steel embedded in a concrete mortar coating and the sulfate ion concentration was found to be insufficient to damage reinforced concrete structures and cement mortar-coated steel at this location. The redox potential is indicative of potentially slightly corrosive resulting from anaerobic soil conditions. Please refer to the Corrosivity Analysis by CERCO Analytical in Appendix B for the complete analysis.

11.0 PRELIMINARY GEOTECHNICAL RECOMMENDATIONS

The following recommendations are for improvements constructed as described in the "Introduction and Site Setting" section of this report. If locations, elevations, structural loads, etc., vary from those assumed, the recommendations contained herein may require modification. If any other improvements not previously described are incorporated into the project, the geotechnical engineer should be contacted to review the applicability of the recommendations included in this report and prepare additional recommendations, if needed.

Unless otherwise noted, the following definitions are used in the recommendations presented below. Where terms are not defined, definitions commonly used in the construction industry are intended.

- **Building Area:** The area within and extending a minimum of 3 feet beyond the perimeter of the foundations of the proposed structure. The building area also includes the footprint of any improvements which are rigidly connected to the structure, such as retaining walls, and that are expected to perform in a similar manner.
- **Flatwork Areas:** The areas within and extending a minimum of 1 foot beyond the limits of exterior pedestrian flatwork.
- **Subgrade:** The elevation of the surface upon which a sand cushion/nonexpansive imported material or aggregate base (AB) will be placed for flatwork.

- **Existing Grade:** Elevations of the site that existed as of the date of this report.
- **Finish Pad Grade:** The elevation in the building area where earthwork operations are typically considered to be complete. It does not include any sand or gravel that might be placed below slabs in association with vapor protection for the slabs.
- **Scarified:** Thoroughly plowed or ripped in two orthogonal directions to a depth of not less than 8 inches.
- **Moisture Conditioned:** Soil moisture content adjusted to optimum moisture content, or just above, prior to application of compactive effort.
- **Compacted/Recompacted:** Soils placed in level lifts not exceeding 8 inches in loose thickness and compacted to a minimum of 90 percent of maximum dry density, unless specified otherwise. The standard tests used to establish maximum dry density and field density should be ASTM D 1557-12 and ASTM D 6938-17, respectively, or other methods acceptable to the geotechnical engineer and jurisdiction.

Site Preparation

1. The site should be prepared for grading by removing, vegetation, debris, and other potentially deleterious materials from areas to receive improvements. The site preparation operations should be observed by the geotechnical engineer prior to continuing grading.

2. Existing utility lines that will not remain in service should be either removed or abandoned. The appropriate method of abandonment will depend upon the location, type, and depth of the utility. Recommendations for abandonment can be made as necessary.

3. Voids created by the removal of materials or utilities described above should be called to the attention of the geotechnical engineer prior to continuing grading.

Grading

1. The site grading plans were not available when this report was prepared. However, it is our understanding that the proposed library is to be constructed on the lower portion of the parcel, which is currently at an elevation of 156 feet. It is our understanding that the finished floor of the library will be at an elevation of 160 feet. As the site is currently below the desired elevation, it is our understanding that construction of the building pad will require fills of approximately three feet to achieve the subslab elevation.

2. In general, the underlying native soil in areas to receive fill, exterior flatwork or new structures should be scarified at least 8 inches, moisture conditioned, and recompacted to a minimum of 90 percent of maximum dry density at 2 percentage points above optimum moisture content.

3. If fill is to be imported for general use at the site, the fill should be coarse grained with a plasticity index of 15 or less. Proposed imported soils should be evaluated by the geotechnical engineer before being transported to the site, and on an intermittent basis during placement and compaction on the site.

4. In the lower pad area to receive approximately three feet of fill, the underlying soil should be cross-scarified at least 8 inches, moisture conditioned, and recompacted to a minimum of 90 percent of maximum dry density at 2 percentage points above optimum moisture content. Fill should be compacted in 8-inch loose lifts to a minimum of 90 percent of maximum dry density at 2 percentage points above optimum moisture content. Fill from the lower pad should be benched into the western pad, where the parking lot is proposed to be located.

5. The upper 8 inches of subgrade soil and the aggregate base courses in areas to receive asphalt concrete pavement should be compacted to a minimum 95 percent of maximum dry density. The subgrade and base should be firm and unyielding when proof rolled with heavy, rubber-tired equipment prior to continuing construction. The subgrade soils should be periodically moistened as necessary prior to placement of the aggregate base to maintain the soil moisture content near optimum.

6. Cut and fill slopes should not be steeper than 2:1, measured horizontally to vertically.

Utility Trenches

1. A select, noncorrosive, granular, easily compacted material should be used as bedding and shading immediately around utility pipes. The site soils may be used for trench backfill above the select material. The upper foot of backfill in landscaped and unimproved areas should consist of native material to reduce the potential for seepage of water into the backfill.

2. In areas to receive asphalt concrete pavement, the upper 8 inches of trench backfill should be compacted to a minimum 95 percent of maximum dry density. Trench backfill in other areas should be compacted to a minimum of 90 percent of maximum dry density. Jetting of utility trench backfill should not be allowed.

3. Where utility trenches extend under perimeter foundations, exterior flatwork, or pavement the trenches should be backfilled entirely with compacted native soil. The zone of native soil should extend to a minimum distance of 2 feet on both sides of the foundation, flatwork, or pavement edges. If utility pipes pass through sleeves cast into the perimeter foundations, the annulus between the pipes and sleeves should be sealed.

4. Long-term settlement of properly compacted imported granular backfill material should be assumed to be about 0.25 to 0.5 percent of the depth of the backfill. Where trenches are backfilled with site soils, the anticipated settlement would be about twice that of granular backfill. Improvements that are constructed over or near trenches should be designed to accommodate the potential for settlement.

5. The recommendations of this section are minimums only and may be superseded by the specifications of the architect/engineer based upon soil corrosivity or the requirements of pipe manufacturers, utility companies or the governing jurisdiction.

Foundations

1. The proposed library building should be supported by conventional spread footings bearing in firm recompacted engineered fill soil or native soils. The foundation trenches should be a minimum of 18 inches below the lowest adjacent grade. All footings should be reinforced as directed by the architect/engineer. The footing excavations should be observed by the geotechnical engineer prior to placement of formwork or reinforcement.

2. In the event that soft soils or other potentially adverse conditions are observed in the excavations, deepening of the footings, compaction of the soil, or other remedial measures may be recommended. Soils exposed in footing excavations should be kept moist prior to concrete placement.

3. The foundation seismic loading should be based on the parameters presented in the Seismic Design Parameters of this report. The foundation design should be based on the following parameters:

Allowable Bearing Capacity (dead loads)	2,000 psf
Allowable Bearing Capacity (dead + live loads)	2,500 psf
Allowable Bearing Capacity (DL+LL+ wind or seismic)	3,000 psf
Modulus of subgrade reaction (K_{30})	100 psi/inch
Estimated total static settlement	<1 inch
Estimated differential static settlement, within 25 feet	0.5 inches
Total liquefaction and seismically-induced settlement	<1 inch
Differential liquefaction and seismically-induced settlement	¼-½ inch

4. Resistance to lateral loads should be calculated based on a passive equivalent fluid pressure of 300 pcf and a friction factor of 0.35. Passive and frictional resistance can be combined in the calculations without reductions. Passive pressure from the top 1-foot of the footing should be ignored unless the area adjacent to the footings is covered with concrete or asphalt concrete pavement.

Slabs-on-Grade and Exterior Flatwork

1. Slabs-on-grade should have a minimum thickness of 4 full inches and be reinforced as directed by the architect/engineer.

2. In areas where moisture transmitted from the subgrade would be undesirable, or where moisture sensitive materials will be stored directly on the slab, a capillary break system that consists of a vapor retarder and a 4-inch-thick, clean crushed rock layer should be placed above the pad subgrade to serve as a capillary break.

3. The vapor retarder should comply with ASTM Standard Specification E 1745-17 and the latest recommendations of ACI Committee 302. The vapor retarder should be installed in accordance with ASTM Standard Practice E 1643-18a. Care should be taken to properly lap and seal the vapor retarder, particularly around utilities, and to protect it from damage during construction.

4. If sand or other permeable material is to be placed over the vapor retarder, the material over the vapor retarder should be only lightly moistened and not saturated prior to casting the slab concrete. Recent studies, including those by ACI Committee 302, have concluded that excess water above the vapor retarder would increase the potential for moisture damage to floor coverings and could increase the potential for mold growth or other microbial contamination. The studies also concluded that it is preferable to eliminate the sand layer and place the slab concrete in direct contact with the vapor retarder, particularly during wet weather construction. However, placing the concrete directly on the vapor retarder would require special attention to using the proper vapor retarder, concrete mix design, and finishing and curing techniques.

5. Assuming that movement (i.e., ¼-inch or more) of exterior flatwork beyond the structure is acceptable, the flatwork should be designed to be independent of the building foundations. The flatwork should not be doweled to foundations, and a separator should be placed between the two. If differential movement of flatwork is considered undesirable, the flatwork should be designed and constructed in roughly the same manner as the structure slabs, and reinforced footings should be provided around the perimeter of the flatwork.

6. To reduce shrinkage cracks in concrete, the concrete aggregates should be of appropriate size and proportion, the water/cement ratio should be low, the concrete should be properly placed and finished, contraction joints should be installed, and the concrete should be properly cured. This is particularly applicable to slabs that will be cast directly upon a vapor retarder and those that will be protected from transmission of vapor by use of admixtures or surface sealers. Concrete materials, placement and curing specifications should be at the direction of the architect/engineer.

Pavement Sections for Parking Areas

1. For the design of asphalt pavements, a bulk sample with an R-Value of 68 was obtained for the soils anticipated at subgrade soil elevation. Results from the R-value test indicate that the samples tested have a high resistance to the types of repetitive loads imposed by traffic. Based on the Caltrans Highway Design Manual, a maximum R-value of 50 is recommended for pavement design. The asphalt concrete (AC) sections were designed in accordance with the Caltrans Highway Design Method for Traffic Indices (TIs) of 4 through 7. Determination of the appropriate TI for each area to be paved is the province of the architect/engineer. The calculated base and AC thicknesses are for compacted material. Normal Caltrans construction tolerances should apply. The aggregate base should conform to Caltrans Class 2. Project Architect should select the appropriate pavement section for the track based on the anticipated traffic.

Traffic Index	AC Thickness (inches)	Class 2 Base Thickness (inches)
4.0	2.5	4.0
4.5	2.5	4.0
5.0	3.0	4.0
5.5	3.0	4.0
6.0	3.5	4.0
6.5	4.0	4.0
7.0	4.0	4.5

Concrete (PCC) Pavements

1. Portland Cement Concrete (PCC) pavements in automobile parking areas should be at least 6 inches thick. Concrete pavement which will experience periodic truck traffic, such as garbage truck or moving van routes, should be a minimum of 8 inches thick.

2. Reinforcing of the concrete is optional. The concrete should have a minimum modulus of rupture of 650 psi. Construction joints should be doweled. The concrete pavement sections should be underlain by a minimum 6 inches of compacted Class 2 aggregate base. A modulus of subgrade reaction of 50 pci may be assumed in the design of the concrete pavements.

General Conditions

1. The subgrade soil should be scarified 12 inches, moisture conditioned as necessary and be compacted to a minimum 95 percent of maximum dry density. Aggregate base should be compacted to at least 95 percent of maximum dry density.

2. The subgrade and base should be firm and unyielding when proof-rolled with heavy, rubber-tired equipment prior to paving. The subgrade soils should be periodically moistened as necessary prior to placement of the aggregate base to maintain the soil moisture content near optimum.

3. Pavement longevity will be enhanced if the surface grade drains away from the edges of the pavement. Finished AC surfaces should slope toward drainage facilities at 2 percent where practicable, but in no case should water be allowed to pond.

4. Cutoff walls below curbs and around landscape islands should be constructed to extend the life of both asphalt and concrete pavement by reducing irrigation water and runoff that seeps into the aggregate base. Where utilized, cutoff walls should extend through the aggregate base to penetrate a minimum of 3 inches into the subgrade soils.

Management of Site Drainage and Maintenance

1. Per Section 1804A.3 of the 2022 CBC, unpaved ground surfaces should be finish-graded to direct surface runoff away from foundations and other improvements at a minimum 5 percent grade for a minimum distance of 10 feet. The site should be similarly sloped to drain away from improvements during construction. If this is not practicable due to the terrain, property lines, or other site features, swales with improved surfaces or other drainage facilities should be provided to divert runoff from those areas.

2. All eaves of the building should be fitted with roof gutters. Runoff should discharge in a nonerosive manner away from foundations and other improvements in accordance with the requirements of the governing agencies. Erosion protection should be placed at all discharge points unless the discharge is to a pavement surface.

3. To reduce the potential for planter drainage gaining access to subslab or subfloor areas, raised planter boxes adjacent to foundations should be installed with drains and sealed sides and bottoms. Drains should also be provided for areas adjacent to the structure that would not otherwise freely drain.

4. The on-site soils are erodible; stabilization of soils disturbed during construction by vegetation or other means during and following construction, is essential to reduce erosion damage. Care should be taken to establish and maintain vegetation. The landscaping should be planned and installed to maintain the surface drainage recommended above. Surface drainage should also be maintained during construction.

5. Maintenance of drainage and other improvements is critical to the long-term stability of the site and the integrity of the structures. Vegetation and erosion matting (if utilized) should be maintained and repaired or augmented as needed. Irrigation systems should be adjusted and/or repaired so that soils around structures are maintained at a relatively uniform year-round moisture content, and are neither over-watered nor allowed to dry and desiccate.

6. To reduce the potential for disruption of drainage patterns and undermining of structures, pavement, etc., rodent activity should be aggressively controlled.

Required Observation and Testing

1. It must be recognized that the recommendations contained in this report are based on a limited subsurface investigation and rely on continuity of the subsurface conditions encountered.

2. It is assumed that the geotechnical engineer will be retained to provide consultation during the design phase, to interpret this report during construction, and to provide construction monitoring in the form of testing and observation.

3. Unless, otherwise stated, the terms "compacted" and "recompacted" refer to soils placed in level lifts not exceeding 8 inches in loose thickness and compacted to a minimum of 90 percent of maximum dry density. The standard tests used to define maximum dry density and field density should be ASTM D 1557-12 and ASTM D 6938-17, respectively, or other methods acceptable to the geotechnical engineer and jurisdiction.

4. “Moisture conditioning” refers to adjusting the soil moisture to at least optimum moisture prior to application of compactive effort.

5. At a minimum, the geotechnical engineer should be retained to provide:
    - Review of final plans and specifications
    - Professional observation during grading and foundation construction
    - Oversight of soils special inspection during grading

6. Special inspection of grading and foundation construction should be provided as per Section 1705A.6 and Table 1705A.6 of the 2022 CBC. The special inspector should be under the direction of the geotechnical engineer. In our opinion, the following operations should be subject to *continuous* soils special inspection:
    - Overexcavation and recompaction
    - Fill placement and compaction

7. In our opinion, periodic special inspection should suffice for the following items: subject to approval by the building official, the exemption under Section 1704A.2 may be utilized to allow *periodic* special inspection of soils. The following items should be inspected and/or tested by the special inspector:

    - Site preparation
    - Foundation excavations
    - Imported materials
    - Compaction of utility trench backfills
    - Compaction of pavement subgrade and aggregate base courses

8. A program of quality control should be developed prior to the beginning of the project. The contractor or project manager should determine any additional inspection items required by the architect/engineer or the governing jurisdiction.

9. The locations and frequencies of compaction tests should be as per the recommendations of the geotechnical engineer at the time of construction. The recommended test locations and frequencies may be subject to modification by the geotechnical engineer, based upon soil and moisture conditions encountered, size and type of equipment used by the contractor, the general trend of the results of compaction tests, or other factors.

10. A preconstruction site meeting among the owner, the geotechnical engineer, the soil special inspector, the architect/engineer, the governing jurisdiction, and contractors should be convened to discuss planned construction procedures and quality control requirements.

11. The geotechnical engineer should be notified at least 48 hours prior to beginning construction operations.

12.0 CLOSURE

This report is valid for the conditions, as they exist at this time for the type of development described herein. Our intent was to perform the investigation in a manner consistent with the

level of care and skill ordinarily exercised by members of the profession currently practicing in the locality of this project under similar conditions at this time. 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 shall be notified for modifications to this report. The geotechnical engineer should be retained early in the design process for the structure to provide geotechnical guidance as the design progresses. Any items not specifically addressed in this report shall comply with the CBC and the requirements of the governing jurisdiction.

The preliminary recommendations of this report are based upon the geotechnical conditions encountered at the site and may be augmented by additional requirements of the architect/engineer, or by additional recommendations provided by the geotechnical engineer based on conditions exposed at the time of construction. If Earth Systems Pacific is not retained to provide construction observation and testing services, it shall not be responsible for the interpretation of the information by others or any consequences arising therefrom.

This document, the data, conclusions, and recommendations contained herein are the property of Earth Systems Pacific. This report shall be used in its entirety, with no individual sections reproduced or used out of context. 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.

13.0 TECHNICAL REFERENCES

ACI (American Concrete Institute). 2004. "Guide for Concrete Floor and Slab Construction." *Document 302.1R04.*

ASCE (American Society of Civil Engineers). 2017. *Minimum Design Loads for Buildings and other Structures (7-10, third printing).* Standards ASCE/SEI 7-16, ASCE.

ASCE (American Society of Civil Engineers). 2018. *Minimum Design Loads for Buildings and other Structures* Supplement 1, effective December 12, 2018.

ASCE (American Society of Civil Engineers). 2021. *Minimum Design Loads for Buildings and other Structures, Supplement 3,* Effective November 5, 2021.

Building Seismic Safety Council (BSSC), 2014. NEHRP Recommended Seismic Provisions for New Buildings and Other Structures, Volume 1: Part 1 Provisions, Part 2 Commentary, FEMA P-1050-1, Washington, D.C., 555 pp.

CBSC (California Building Standards Commission). 2022. *California Building Code (CBC).* CBSC.

California Environmental Protection Agency, Department of Toxic Substances Control. 2021. *Envirostor website*, http://www.envirostor.dtsc.ca.gov/public, accessed December 2023.

California Environmental Protection Agency, State Water Resources Control Board. 2021. *GeoTracker website*, http://geotracker.waterboards.ca.gov, accessed December 2023.

California Geological Survey, 2009, GUIDELINES FOR EVALUATION AND MITIGATION OF SEISMIC HAZARDS IN CALIFORNIA, Special Publication 117A.

California Geological Survey, 2018, FAULT-RUPTURE HAZARD ZONES IN CALIFORNIA, Alquist Priolo Earthquake Fault Zoning Act with Index to Earthquake Fault Zones Maps, CGS Special Publication 42 (2018).

CGS (California Geological Survey). 2022. "Checklist for Review of Engineering Geology and Seismology Reports for California Public Schools, Hospitals, and Essential Services Buildings." Note 48, California Geologic Survey.

Churchill, R.K., 2007, “Radon Potential Zone Map for Western Monterey County, California,” California Geological Survey, Special Report 201.

Churchill, R.K., and Hill, R.L., 2000, “A General Location Guide for Ultramafic Rocks in California – Areas More Likely to Contain Naturally Occurring Asbestos,” California Geological Survey, Open-File Report 2000-19

Caltrans (California Department of Transportation). 2006 September. Updated 2008. *Highway Design Manual.*

CBSC (California Building Standards Commission). 2022. *California Building Code (CBC).* CBSC.

Dibblee, T.W., and Minch, J.A., 2007, Geologic Map of the Marina and Salinas Quadrangles, Monterey County, California: Dibblee Geological Foundation, Dibblee Foundation Map DF-353 scale 1: 24,000.

Dupre, W.R., and Tinsley, J.C., 1980, Maps Showing Geology and Liquefaction Potential of Northern Monterey and Southern Santa Cruz Counties, California: Geologic Map, Sheet 1 of 2, scale 1: 62,000

Dupre, W.R., and Tinsley, J.C., 1980, Maps Showing Geology and Liquefaction Potential of Northern Monterey and Southern Santa Cruz Counties, California: Liquefaction Potential Map, Sheet 2 of 2, scale 1: 62,000

DSA (Division of the State Architect). 2013. Interpretation of Regulations (IR) Document A-4.13, rev 06-22-23. Geologic Hazards Report Requirements.

Europa Technologies. 2024. Google Earth [website], retrieved from: http://www.google.com/earth/index.html

Federal Emergency Management Agency, “Flood Insurance Rate Map,” Map Number 06053C0215G, dated April 2, 2009

Jennings, Charles W. and William A. Bryant. 2010. " Fault Activity Map of California," *California Geological Survey.*

Monterey County Geologic Hazards Map, web application (2024)

PEER (Pacific Earthquake Engineering Research Center), 2015, Next Generation Attenuation (NGA)-West ground motion attenuation models and database, accessed at https://ngawest2.berkeley.edu/

SEAOC (Structural Engineers Association of California). 2024. “Seismic Design Map Tool.” Retrieved from: https://seismicmaps.org/

State of California, 2021, Tsunami Hazard Area Map, Monterey County; produced by the California Geological Survey, the California Governor's Office of Emergency Services, and AECOM; dated March 23, 2021, mapped at multiple scales.

Terratech, Inc., 1989, Supplemental Fault Investigation, Las Palmas Ranch Development, Monterey County, California: report, 3p.

USGS (United States Geological Survey). 2013. The Uniform California Earthquake Rupture Forecast, Version 3 (UCERF3) – The Time Dependent Model, USGS Open File Report 2013-1165.

USGS (United States Geological Survey), 2024. “USGS Earthquake Hazard Toolbox" United States Geological Survey. Retrieved from: https://earthquake.usgs.gov/nshmp/

USGS (United States Geological Survey). 2018. Earthquake Hazards Program, retrieved from: http://earthquake.usgs.gov/hazards/designmaps/

Wagner, D.L., Greene, H.G., Saucedo, G.J., and Pridmore, C.L., 2002, Geologic Map of the Monterey 30'x60' quadrangle and adjacent areas, California, USGS Regional Geologic Map RGM-1, 1:100,000.

Working Group on California Earthquake Probabilities, 2002, EARTHQUAKE PROBABILITIES IN THE SAN FRANCISCO BAY REGION: 2002-2030, USGS Open File Report 03-214.

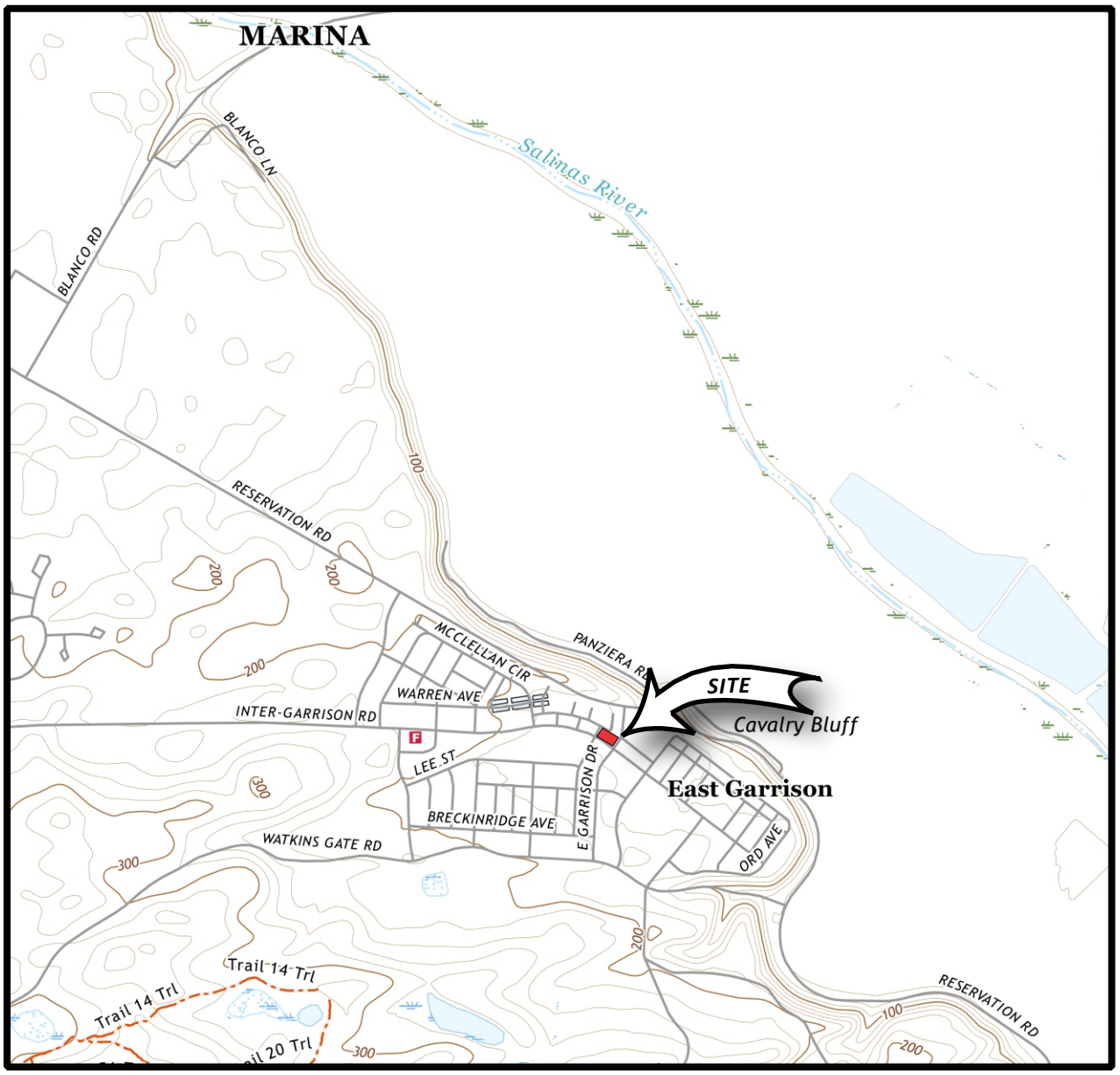
Working Group on California Earthquake Probabilities, 2008, THE UNIFORM CALIFORNIA EARTHQUAKE RUPTURE FORECAST, VERSION 2 (UCERF 2), U.S. Geological Survey, Open-File Report 2007 – 1437, California Geological Survey, Special Report 203.

Working Group on California Earthquake Probabilities, 2015, THE UNIFORM CALIFORNIA EARTHQUAKE RUPTURE FORECAST, VERSION 3 (UCERF 3), U.S. Geological Survey, Open-File Report 2013 – 1165, California Geological Survey, Special Report 228.

FIGURES

Figure 1 - Vicinity Map
Figure 2 - Site Geologic and Boring Location Map
Figure 3 - Local Geologic Map
Figures 4a - Geologic Cross Section A-A’
Figure 4b – Geologic Cross Section B-B’
Figure 5a – Fault Location Map
Figure 5b – Geologic Hazard Zones
Figure 6 - Regional Faults and Earthquakes
Figure 7 - Selected Earthquakes
Figure 8 - Flood Zone Map

Figure 1



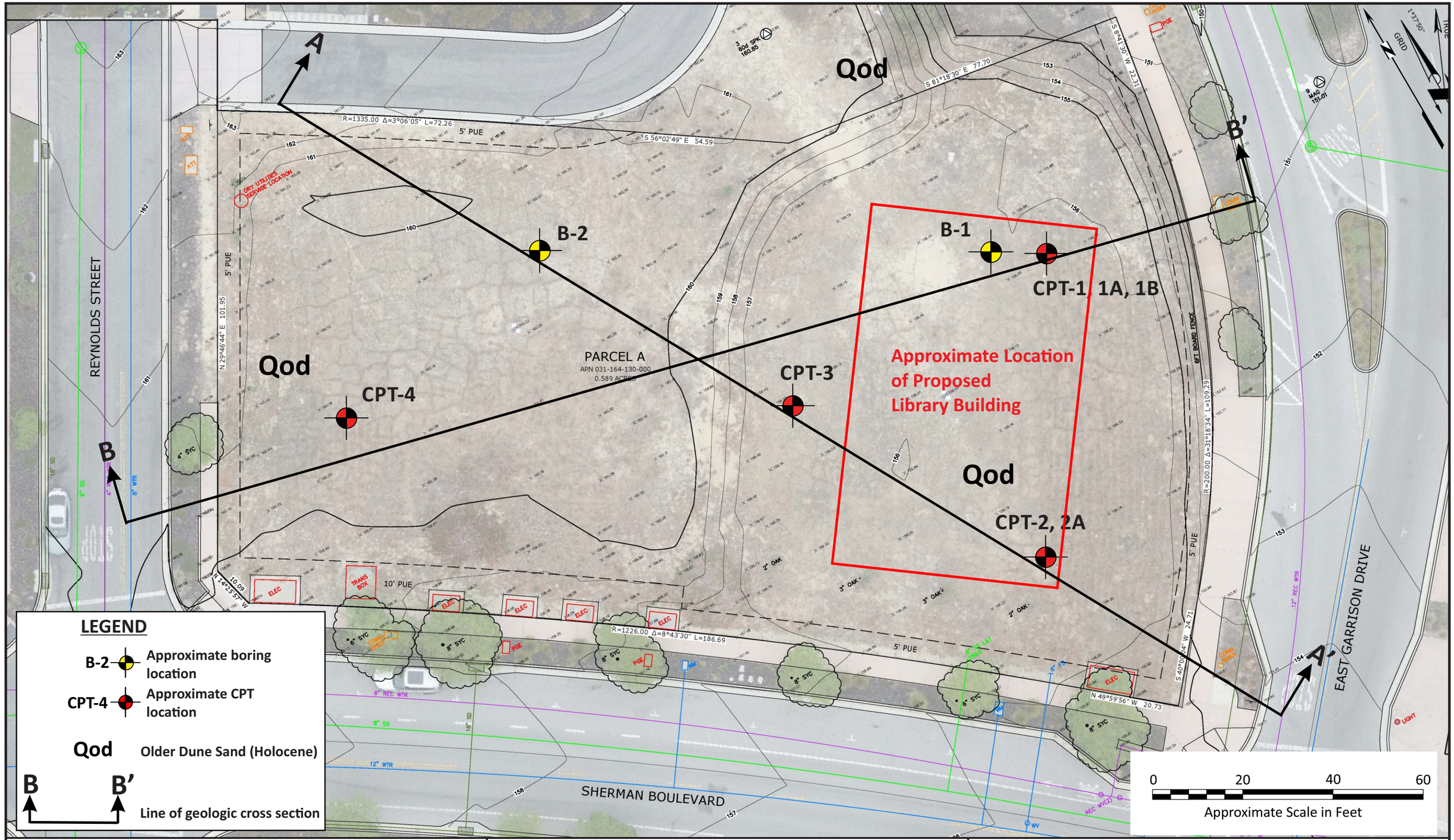
BASE: USGS (2021) Marina and Salinas 7.5-minute Topographic Quads

0 2000 4000 6000

Approximate Scale in Feet

EARTH SYSTEMS	East Garrison Branch Library 13993 Sherman Boulevard East Garrison, California	Vicinity Map 306389-001

Figure 2

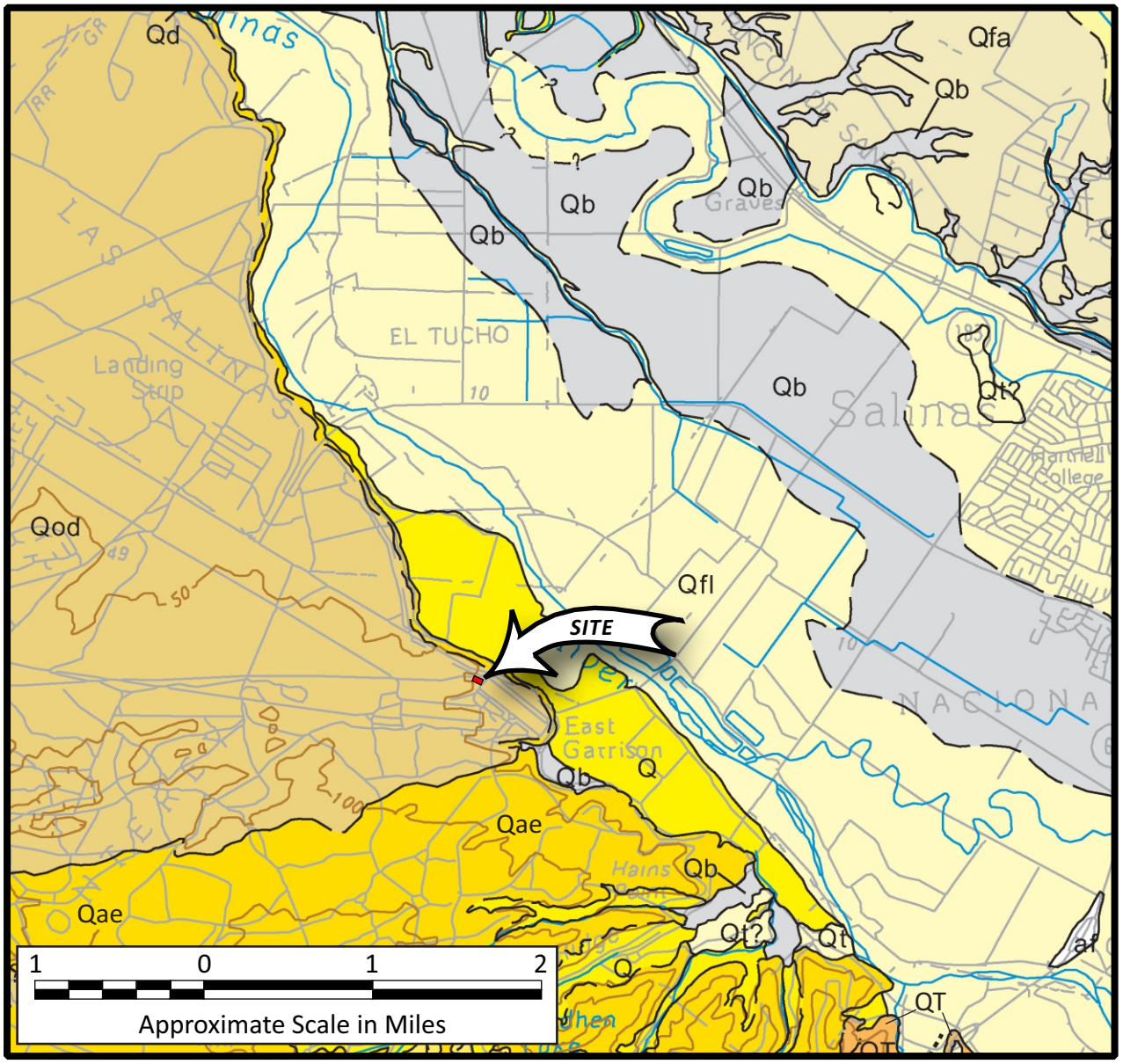


LEGEND

- B-2 — Approximate boring location
- CPT-4 — Approximate CPT location
- Qod — Older Dune Sand (Holocene)
- B – B' — Line of geologic cross section

Earth Systems Pacific	East Garrison Branch Library 13993 Sherman Boulevard Marina, California	Site Geologic and Boring Location Map 306389-001

Figure 3



BASE: Wagner, D.L., Greene, H.G. (2002) Geologic Map of the Monterey 30'x60' Quadrangle and Adjacent Areas, Calif.

Geologic contact (dashed if approximated)

Mapped Geologic Units

HOLOCENE

Q Alluvium **Qb** Basin deposits **Qfl** Flood plain deposits

PLEISTOCENE

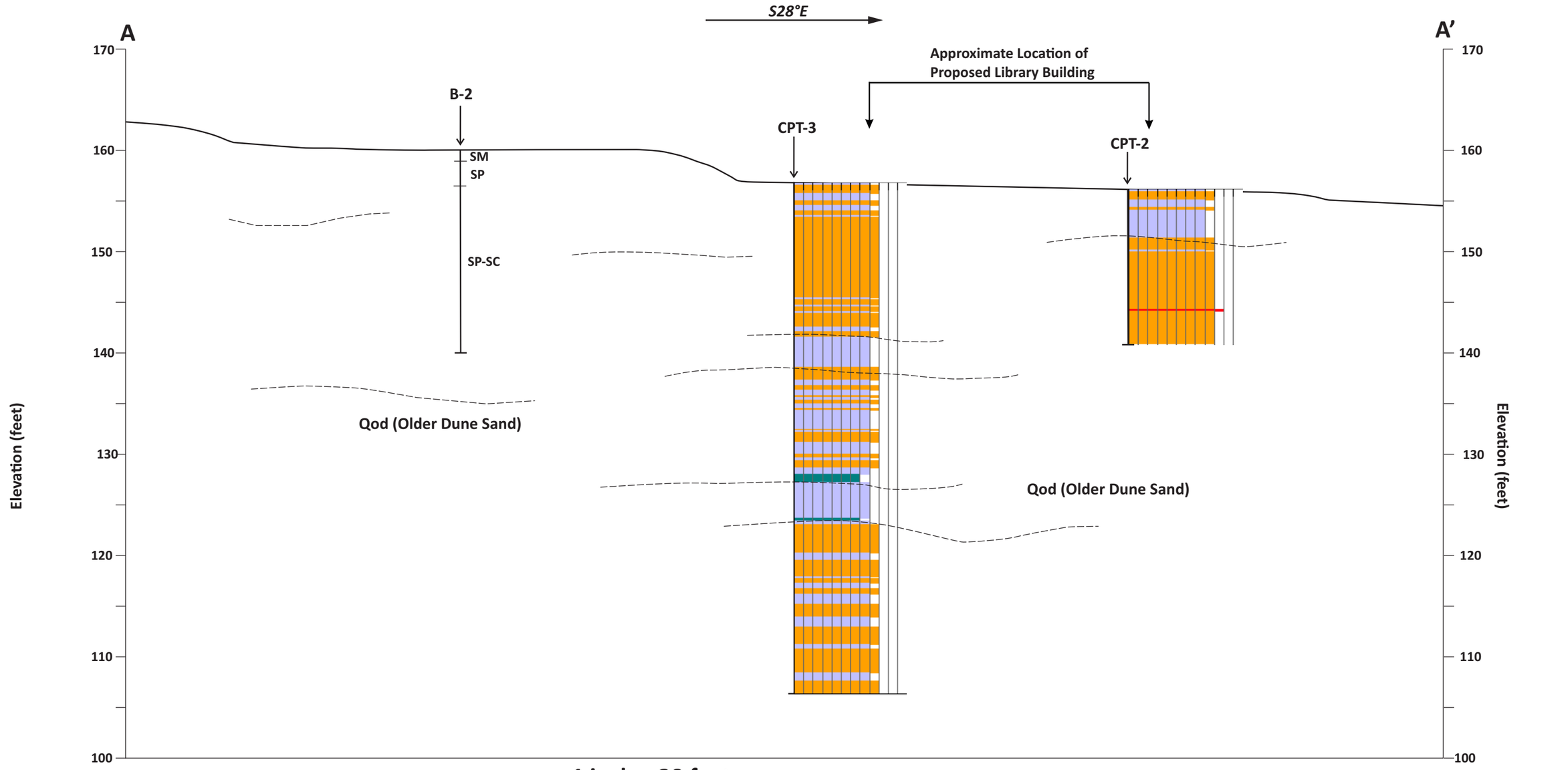
Qod Older Dune Sand **Qfa** Fan deposits of Antioch

Qae Aromas Sand, Eolian facies **Qt** Terrace deposits

PLIO-PLEISTOCENE

QT Plio-Pleistocene Continental deposits

EARTH SYSTEMS	East Garrison Branch Library 13993 Sherman Boulevard Marina, California	Local Geologic Map 306389-001



1 inch = 20 feet
2x vertical exaggeration

EXPLANATION: (See Boring Log Legend in Appendix A for Soil Classifications)

- 1 - sensitive fine grained
- 2 - organic material
- 3 - clay
- 4 - silty clay to clay
- 5 - clayey silt to silty clay
- 6 - sandy silt to clayey silt
- 7 - silty sand to sandy silt
- 8 - sand to silty sand
- 9 - sand
- 10 - gravelly sand to sand
- 11 - very stiff fine grained (*)
- 12 - sand to clayey sand (*)

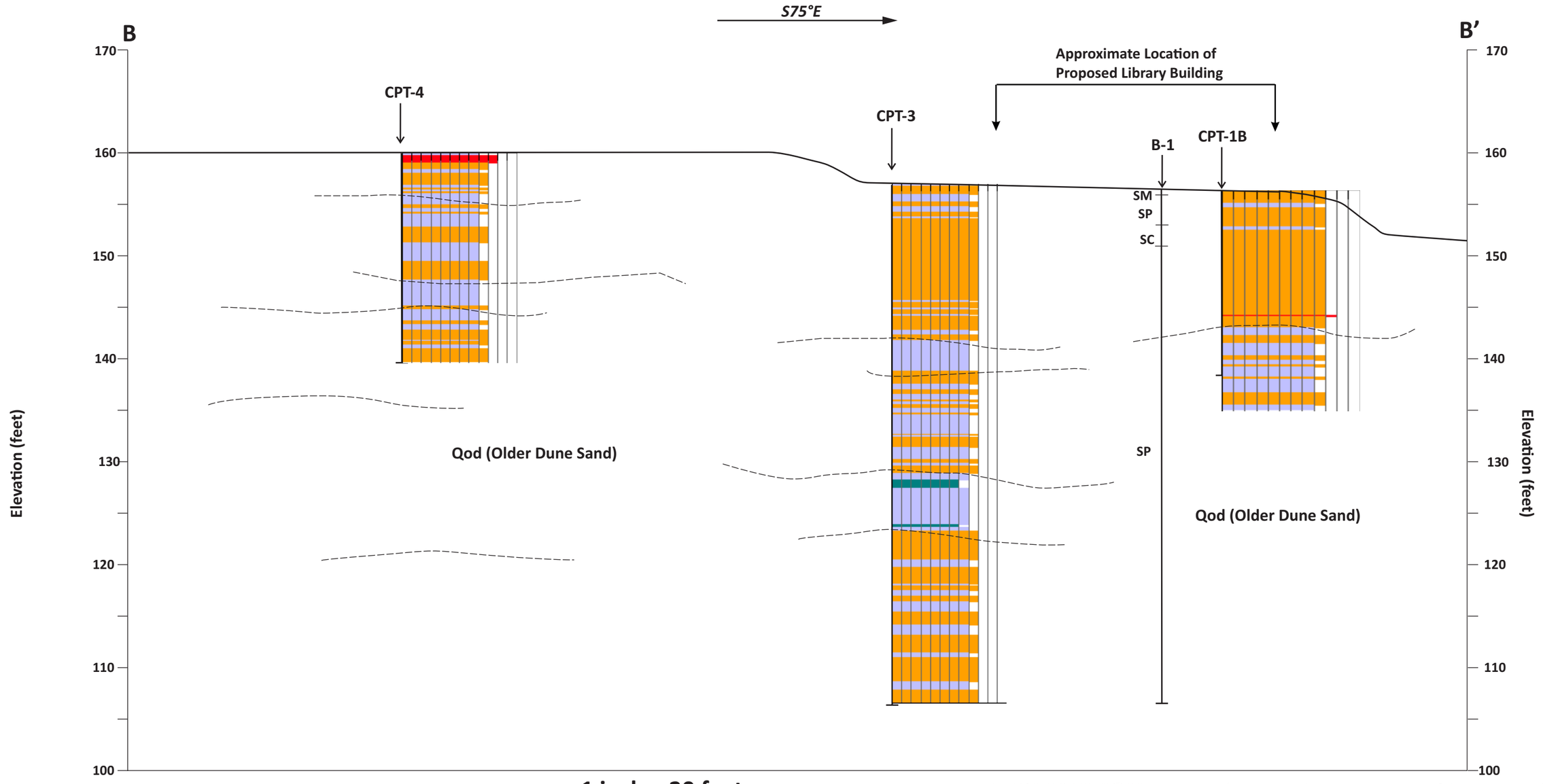
Earth Systems Pacific

East Garrison Branch Library
13993 Sherman Boulevard
Marina, California

GEOLOGIC CROSS-SECTION A-A'

306389-001

Figure 4B



1 inch = 20 feet
2x vertical exaggeration

EXPLANATION: (See Boring Log Legend in Appendix A for Soil Classifications)

1 - sensitive fine grained	4 - silty clay to clay	7 - silty sand to sandy silt	10 - gravelly sand to sand
2 - organic material	5 - clayey silt to silty clay	8 - sand to silty sand	11 - very stiff fine grained (*)
3 - clay	6 - sandy silt to clayey silt	9 - sand	12 - sand to clayey sand (*)

Earth Systems Pacific

East Garrison Branch Library
13993 Sherman Boulevard
Marina, California

GEOLOGIC CROSS-SECTION B-B'

306389-001

Figure 5a

BASE: Monterey County RMA (2023) Geologic Hazards Zones GIS web application, shaded relief basemap

- - - - - - USGS Quaternary Fault

..... Fault, concealed

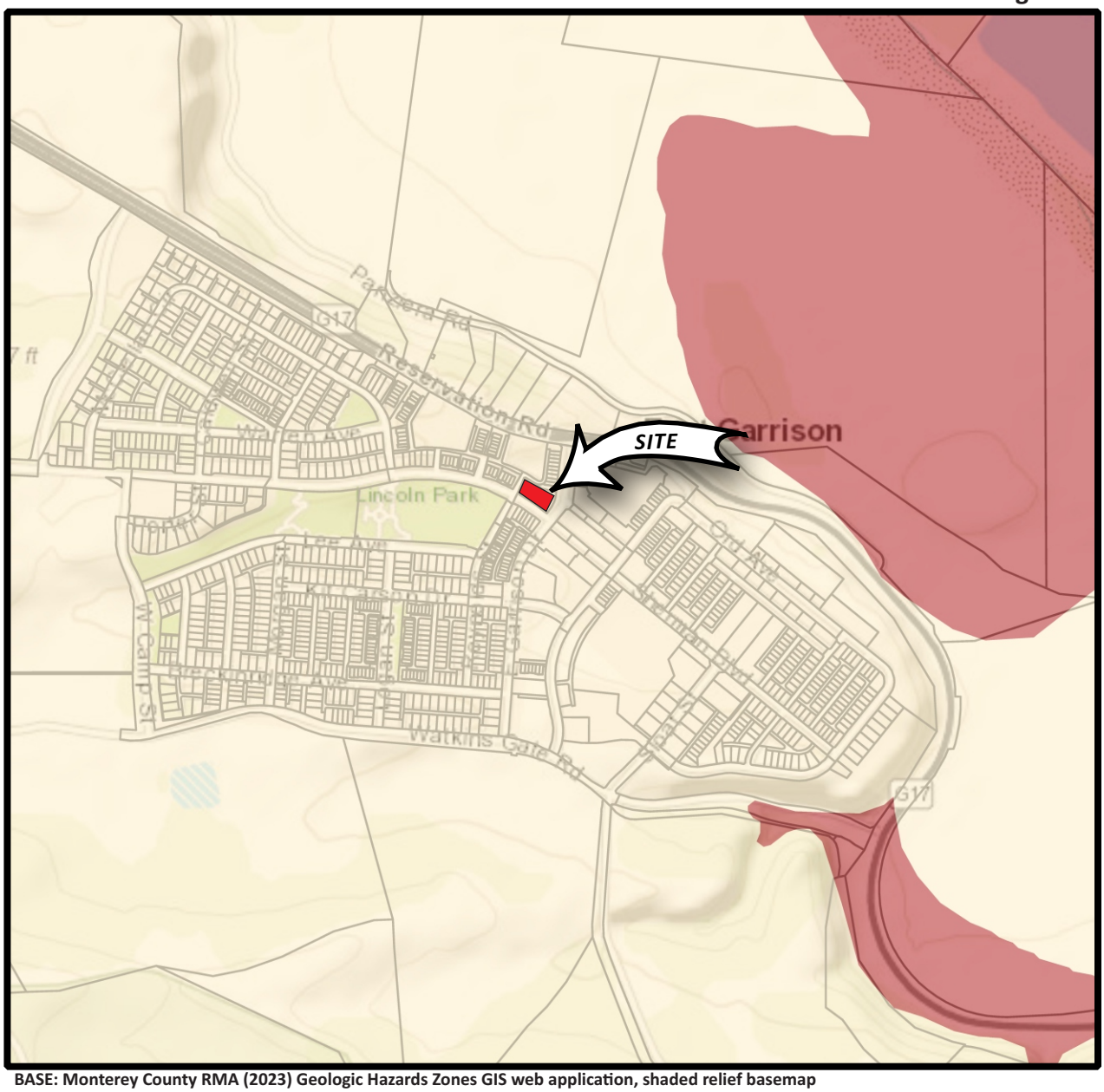
..... Fault, concealed-queried

0 1000 2000 3000

Approximate Scale in Feet

EARTH SYSTEMS	East Garrison Branch Library 13993 Sherman Boulevard East Garrison, California	Fault Location Map 306389-001

Figure 5b



BASE: Monterey County RMA (2023) Geologic Hazards Zones GIS web application, shaded relief basemap

County Geologic Hazard Zones

Liquefaction susceptibility

- High
- Moderate
- Low
- Variable

Landslide susceptibility

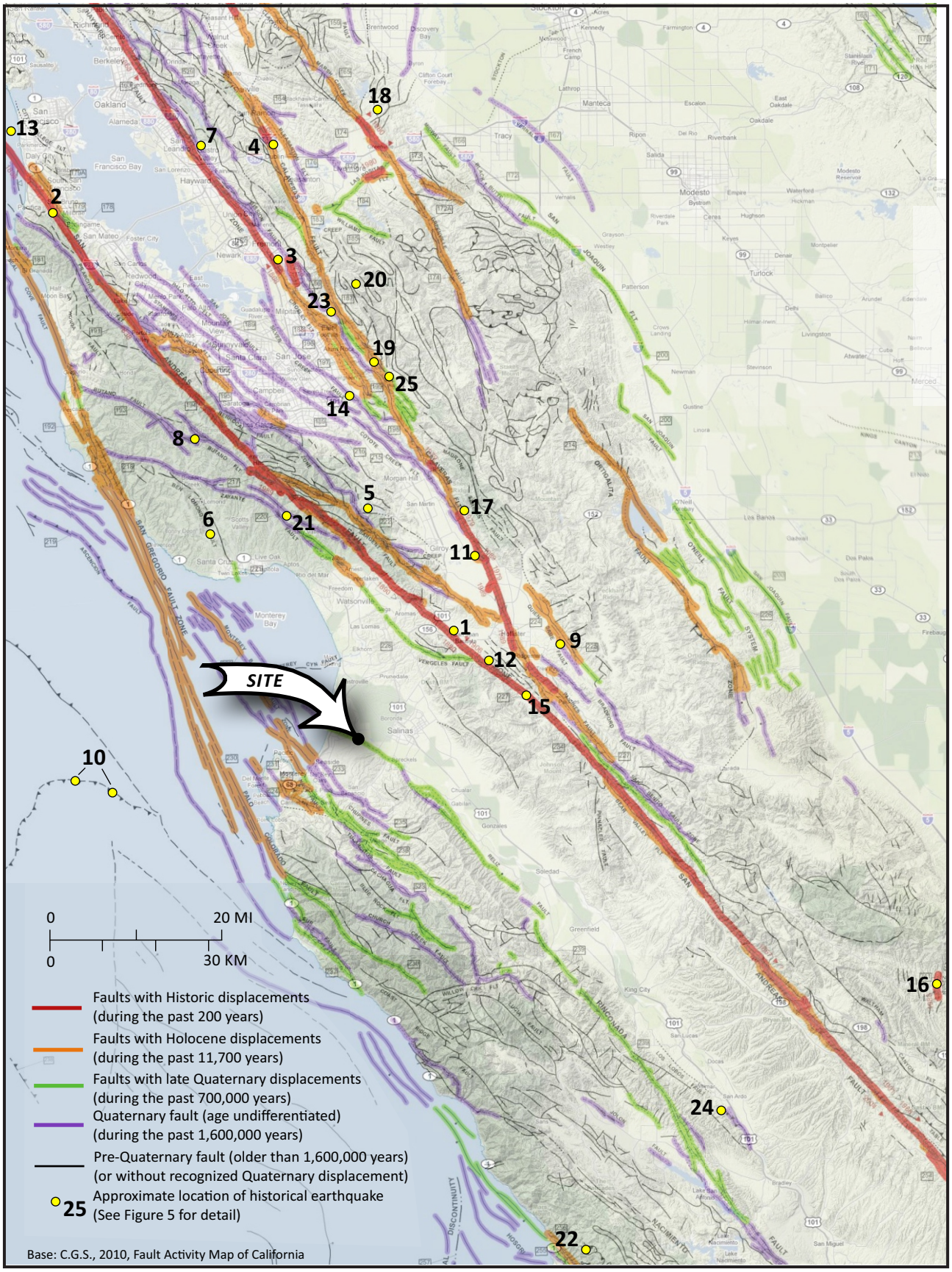
- High
- Moderate
- Low

0 1000 2000 3000

Approximate Scale in Feet

EARTH SYSTEMS	East Garrison Branch Library 13993 Sherman Boulevard East Garrison, California	Geologic Hazards Map 306389-001

Figure 6



EARTH SYSTEMS	East Garrison Branch Library 13993 Sherman Boulevard East Garrison, California	Regional Faults and Earthquakes 306389-001

Figure 7

Selected Monterey BayArea Earthquakes

Location Number (See Regional Faults and Earthquakes map For Locations)	Earthquake and Year	Magnitude Reported	Reference
1	Monterey Bay Area, 1836	M 6.8	Toppozada, 1998
2	San Francisco, 1838	M 7.0	Toppozada, 1981
3	Hayward, 1858	M 6.1	Toppozada, 1981
4	Calaveras-Dublin, 1861	M 5.9	Toppozada, 1981
5	Santa Clara Valley, 1864	M 5.9	Toppozada, 1981
6	Santa Cruz, 1865	M 6.3	Toppozada, 1981
7	Hayward, 1868	M 6.8	Toppozada, 1981
8	San Andreas, 1870	M 5.8	Toppozada, 1981
9	Quien Sabe, 1986	M 5.5	NCDEC, 2010
10	Monterey Bay		
	1926	M 6.1	NCDEC, 2010
	1926	M 6.1	NCDEC, 2010
11	Calaveras, 1897	M 6.2	Toppozada, 1981
12	Hollister Area, 1939	M 5.5	NCDEC, 2010
13	San Francisco, 1906	M 7.8	U.S. Geological Survey, 2010
14	San Jose, 1911	M 6.5	Toppozada and Parke, 1982
15	San Andreas, 1961	M 5.6	NCDEC, 2010
16	Nunez Fault, 1982	M 5.4	NCDEC, 2010
17	Coyote Lake, 1979	M 5.9	Hart, 1988
18	Greenville, 1980	M 5.8	Oppenheimer, 1990
19	Morgan Hill, 1984	M 6.2	Oppenheimer, 1990
20	Mount Lewis, 1986	M 5.7	U.S. Geological Survey, 1989
21	Loma Prieta, 1989	M 7.1	U.S. Geological Survey, 1989
22	Central California		
	1983	M 5.2	NCDEC, 2010
	1991	M 5.2	NCDEC, 2010
23	Calaveras Reservoir, 2007	M 5.4	U.S. Geological Survey, 2009
24	San Ardo, 1955	M 5.2	NCDEC, 2010
25	Alum Rock, 2022	M 5.1	USGS, 2022

NOTE: Modified After Geomatrix, (1992)
Updated, 2022

National Flood Hazard Layer FIRMette

FEMA

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

- SPECIAL FLOOD HAZARD AREAS
  - Without Base Flood Elevation (BFE) *Zone A, V, A99*
  - With BFE or Depth *Zone AE, AO, AH, VE, AR*
  - Regulatory Floodway
- OTHER AREAS OF FLOOD HAZARD
  - 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
  - Future Conditions 1% Annual Chance Flood Hazard *Zone X*
  - Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
  - Area with Flood Risk due to Levee *Zone D*
- OTHER AREAS
  - NO SCREEN Area of Minimal Flood Hazard *Zone X*
  - Effective LOMRs
  - Area of Undetermined Flood Hazard *Zone D*
- GENERAL STRUCTURES
  - Channel, Culvert, or Storm Sewer
  - Levee, Dike, or Floodwall
- OTHER FEATURES
  - 20.2 Cross Sections with 1% Annual Chance
  - 17.5 Water Surface Elevation
  - Coastal Transect
  - Base Flood Elevation Line (BFE)
  - Limit of Study
  - Jurisdiction Boundary
  - Coastal Transect Baseline
  - Profile Baseline
  - Hydrographic Feature
- MAP PANELS
  - Digital Data Available
  - No Digital Data Available
  - Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 1/16/2024 at 4:35 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

EARTH SYSTEMS

East Garrison Branch Library
13993 Sherman Boulevard
East Garrison, California

Flood Zone Map

306389-001

APPENDIX A

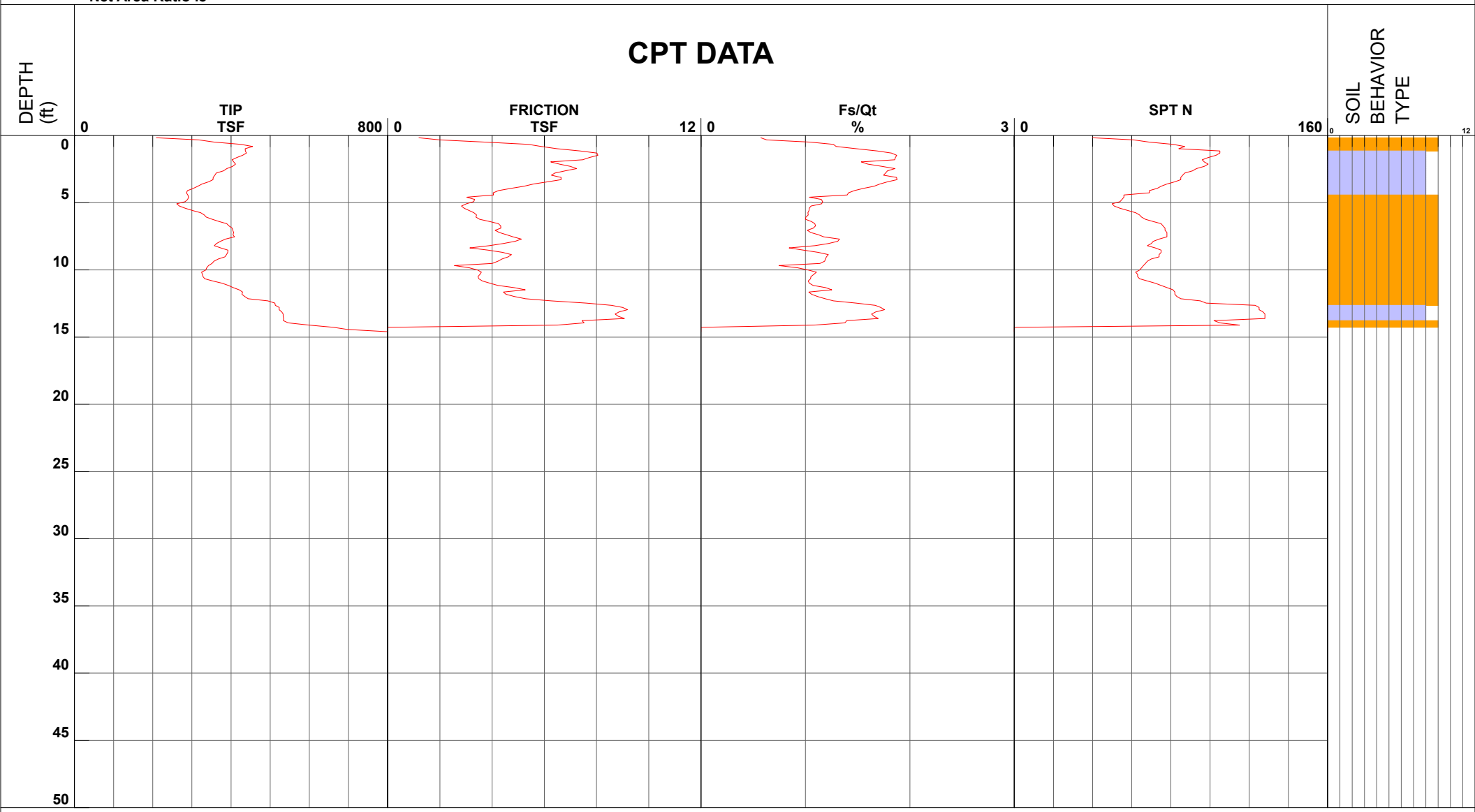
Cone Penetrometer Test (CPT) Data
Boring Log
Boring Log Legend

Earth Systems

Project	East Garrison Library	Operator	AJ-ER	Filename	SDF(063).cpt
Job Number	306389-001	Cone Number	DPG1556	GPS	
Hole Number	CPT-01	Date and Time	10/31/2023 9:16:46 AM	Maximum Depth	14.60 ft
EST GW Depth During Test		0.00 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Cone Size 15cm squared

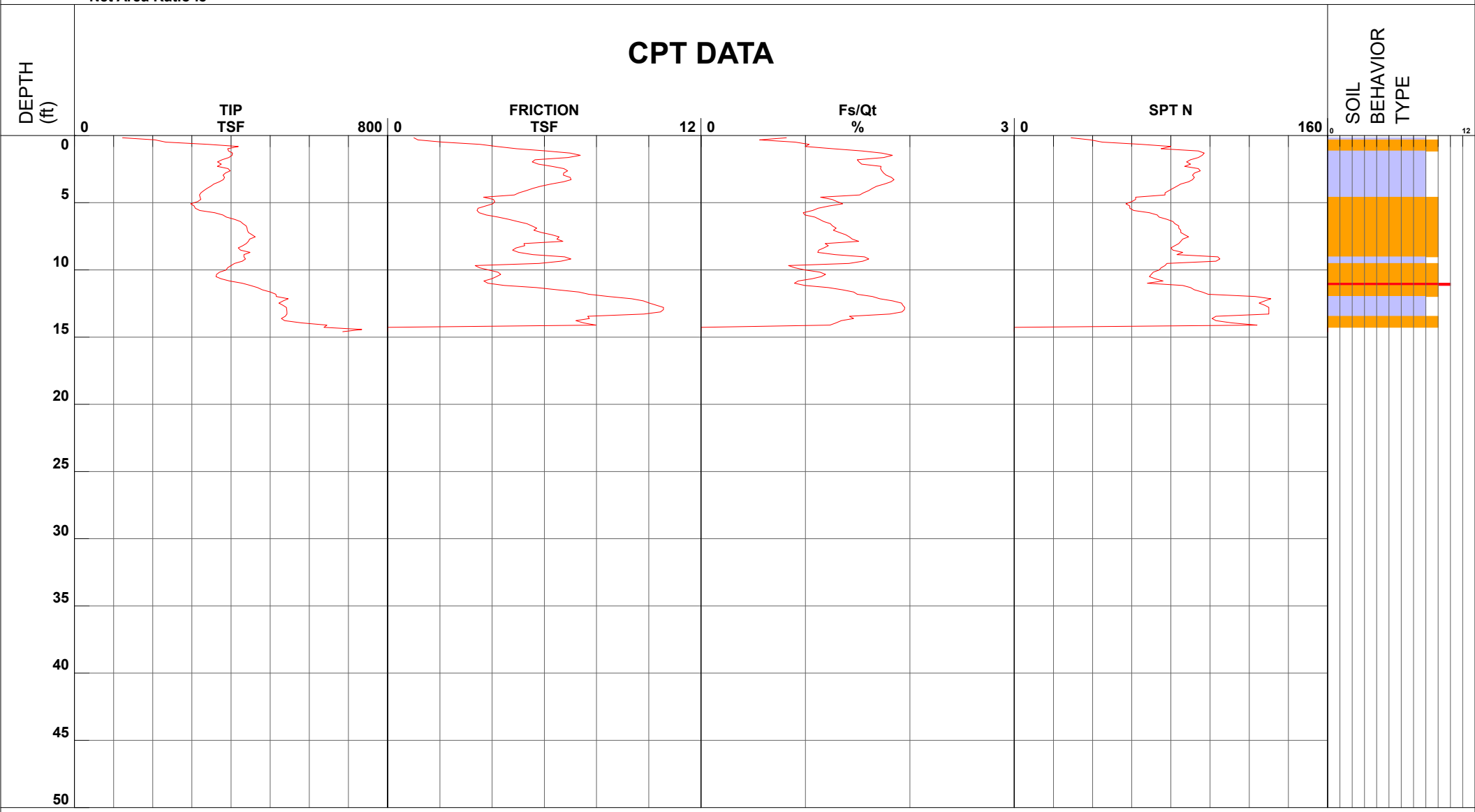
S*Soil behavior type and SPT based on data from UBC-1983

Earth Systems

Project	East Garrison Library	Operator	AJ-ER	Filename	SDF(064).cpt
Job Number	306389-001	Cone Number	DPG1556	GPS	
Hole Number	CPT-01A	Date and Time	10/31/2023 9:42:42 AM	Maximum Depth	14.60 ft
EST GW Depth During Test		0.00 ft			

Net Area Ratio .8

CPT DATA



- 1 - sensitive fine grained
- 2 - organic material
- 3 - clay
- 4 - silty clay to clay
- 5 - clayey silt to silty clay
- 6 - sandy silt to clayey silt
- 7 - silty sand to sandy silt
- 8 - sand to silty sand
- 9 - sand
- 10 - gravelly sand to sand
- 11 - very stiff fine grained (*)
- 12 - sand to clayey sand (*)

Cone Size 15cm squared

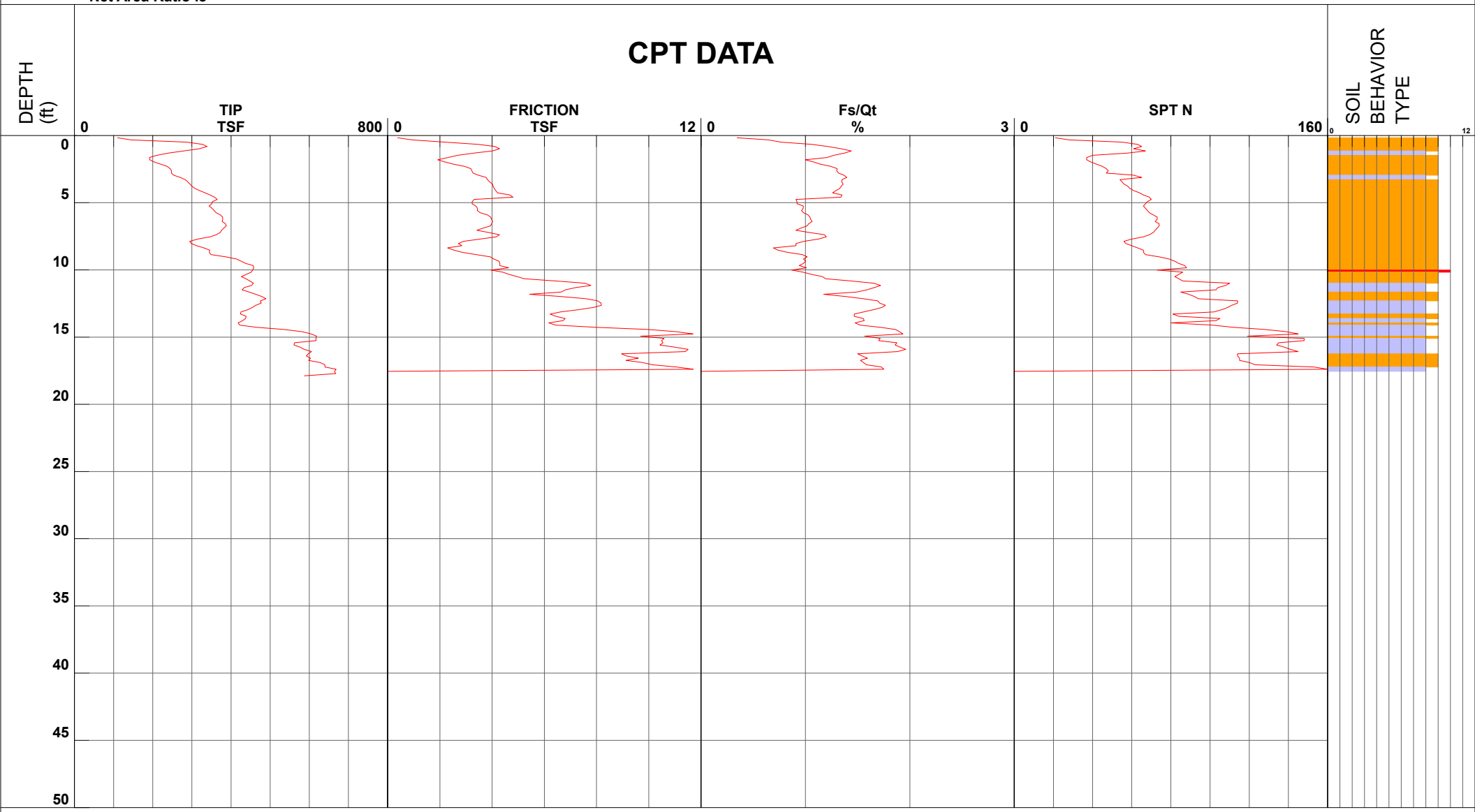
S*Soil behavior type and SPT based on data from UBC-1983

Earth Systems

Project	East Garrison Library	Operator	AJ-ER	Filename	SDF(065).cpt
Job Number	306389-001	Cone Number	DPG1556	GPS	
Hole Number	CPT-01B	Date and Time	10/31/2023 10:08:20 AM	Maximum Depth	17.88 ft
EST GW Depth During Test		0.00 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Cone Size 15cm squared

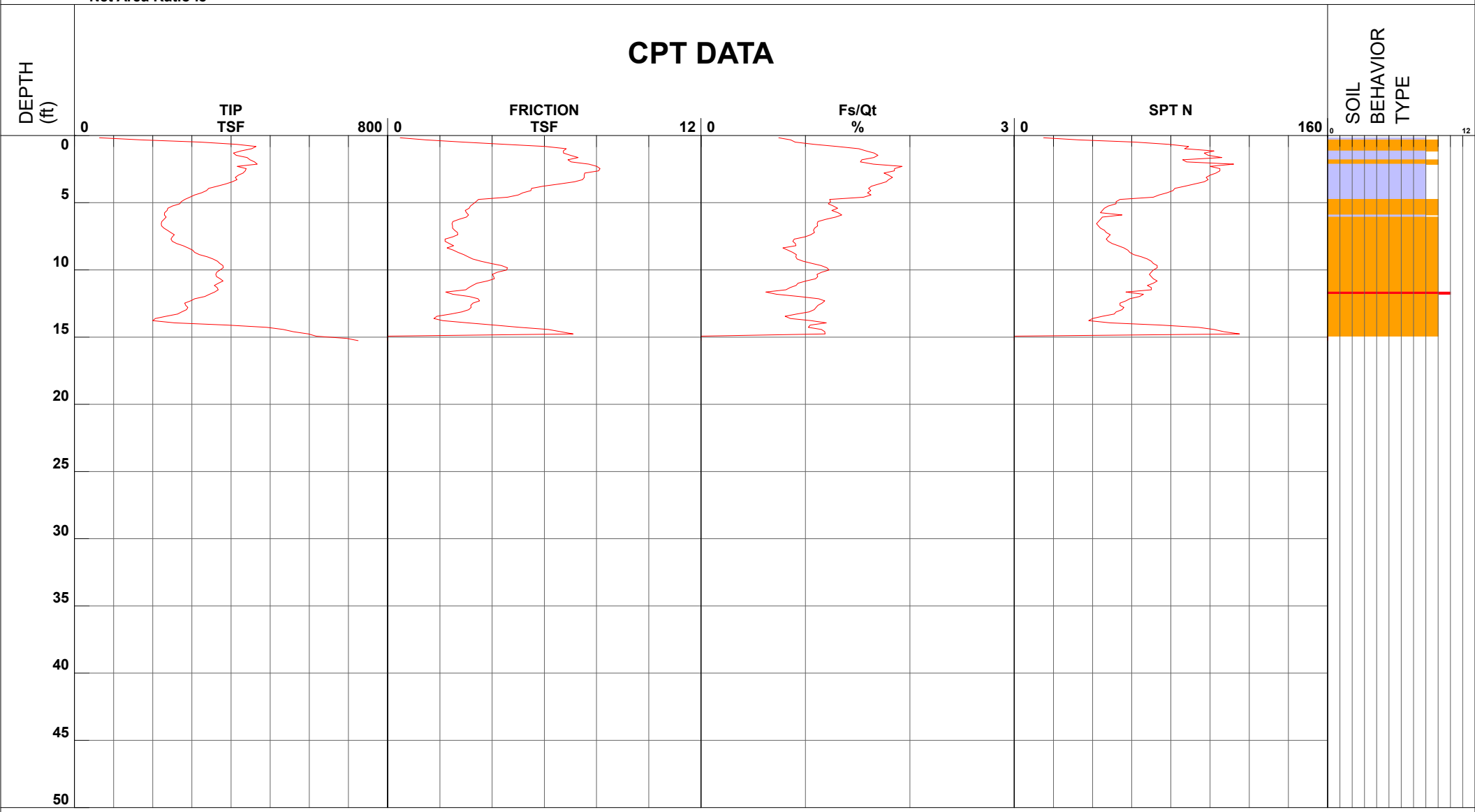
S*Soil behavior type and SPT based on data from UBC-1983

Earth Systems

Project	East Garrison Library	Operator	AJ-ER	Filename	SDF(067).cpt
Job Number	306389-001	Cone Number	DPG1556	GPS	
Hole Number	CPT-02	Date and Time	10/31/2023 11:22:52 AM	Maximum Depth	15.26 ft
EST GW Depth During Test		0.00 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Cone Size 15cm squared

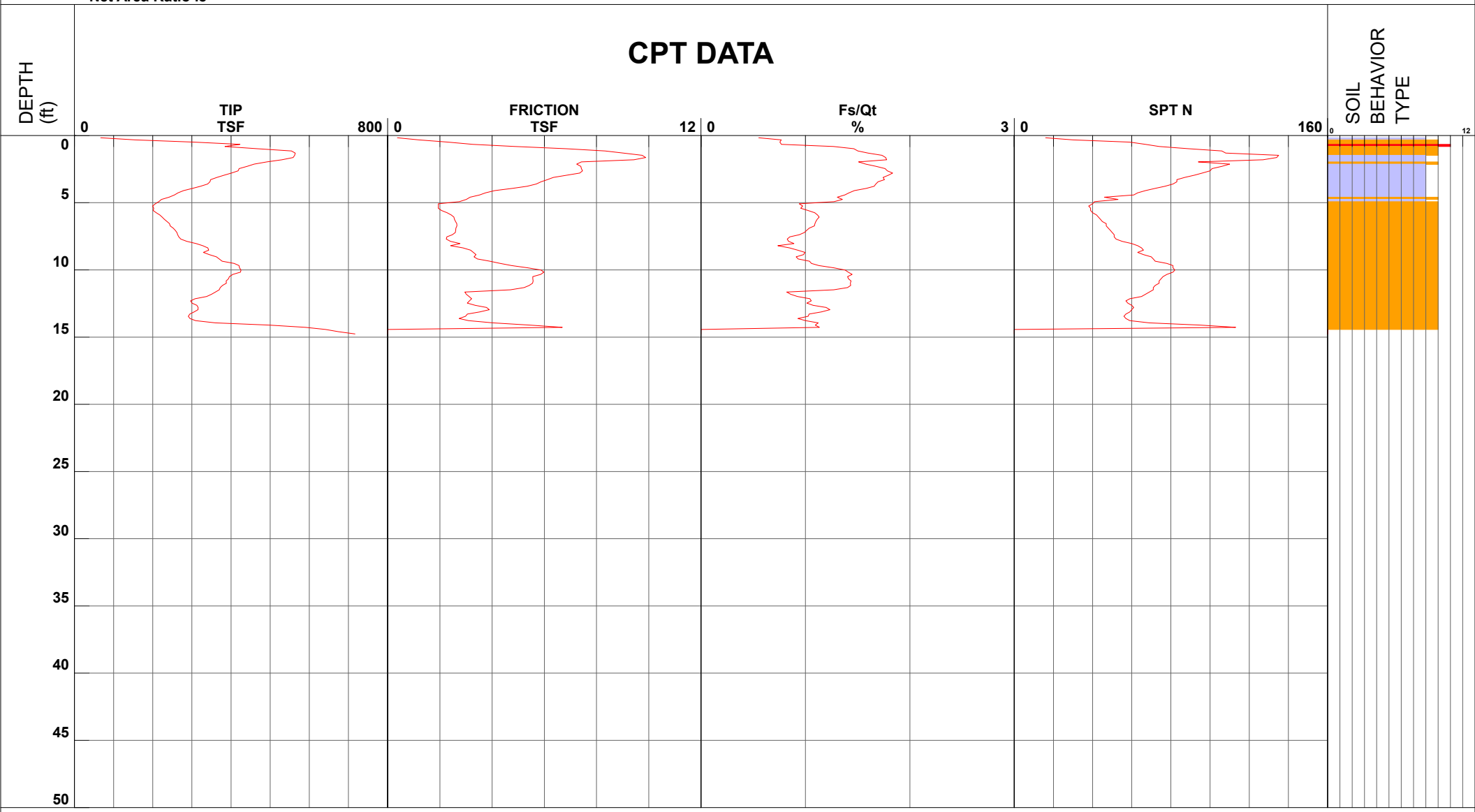
S*Soil behavior type and SPT based on data from UBC-1983

Earth Systems

Project	East Garrison Library	Operator	AJ-ER	Filename	SDF(068).cpt
Job Number	306389-001	Cone Number	DPG1556	GPS	
Hole Number	CPT-02A	Date and Time	10/31/2023 11:39:45 AM	Maximum Depth	14.76 ft
EST GW Depth During Test		0.00 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Cone Size 15cm squared

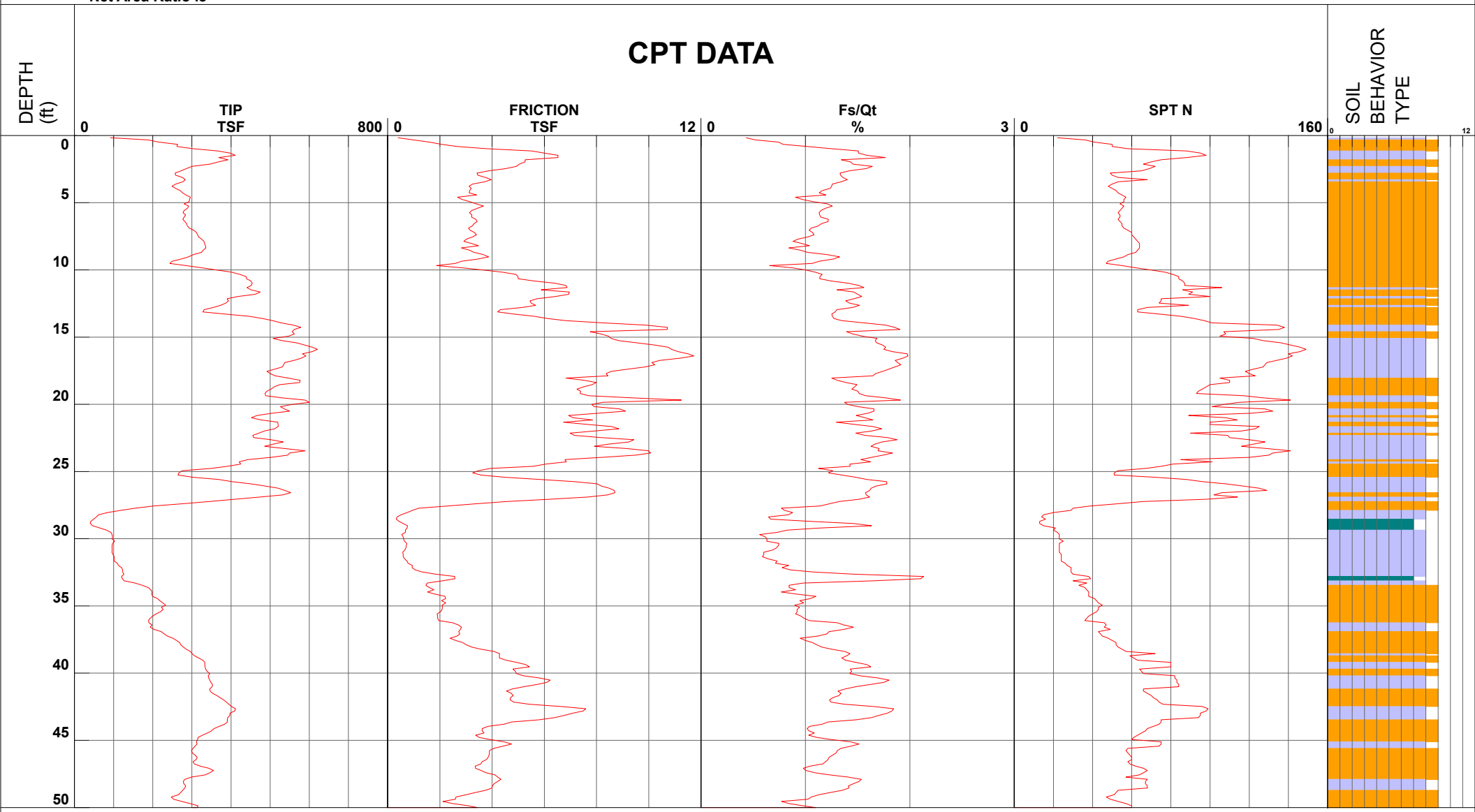
S*Soil behavior type and SPT based on data from UBC-1983

Earth Systems

Project	East Garrison Library	Operator	AJ-ER	Filename	SDF(066).cpt
Job Number	306389-001	Cone Number	DPG1556	GPS	
Hole Number	CPT-03	Date and Time	10/31/2023 10:30:23 AM	Maximum Depth	50.52 ft
EST GW Depth During Test		0.00 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Cone Size 15cm squared

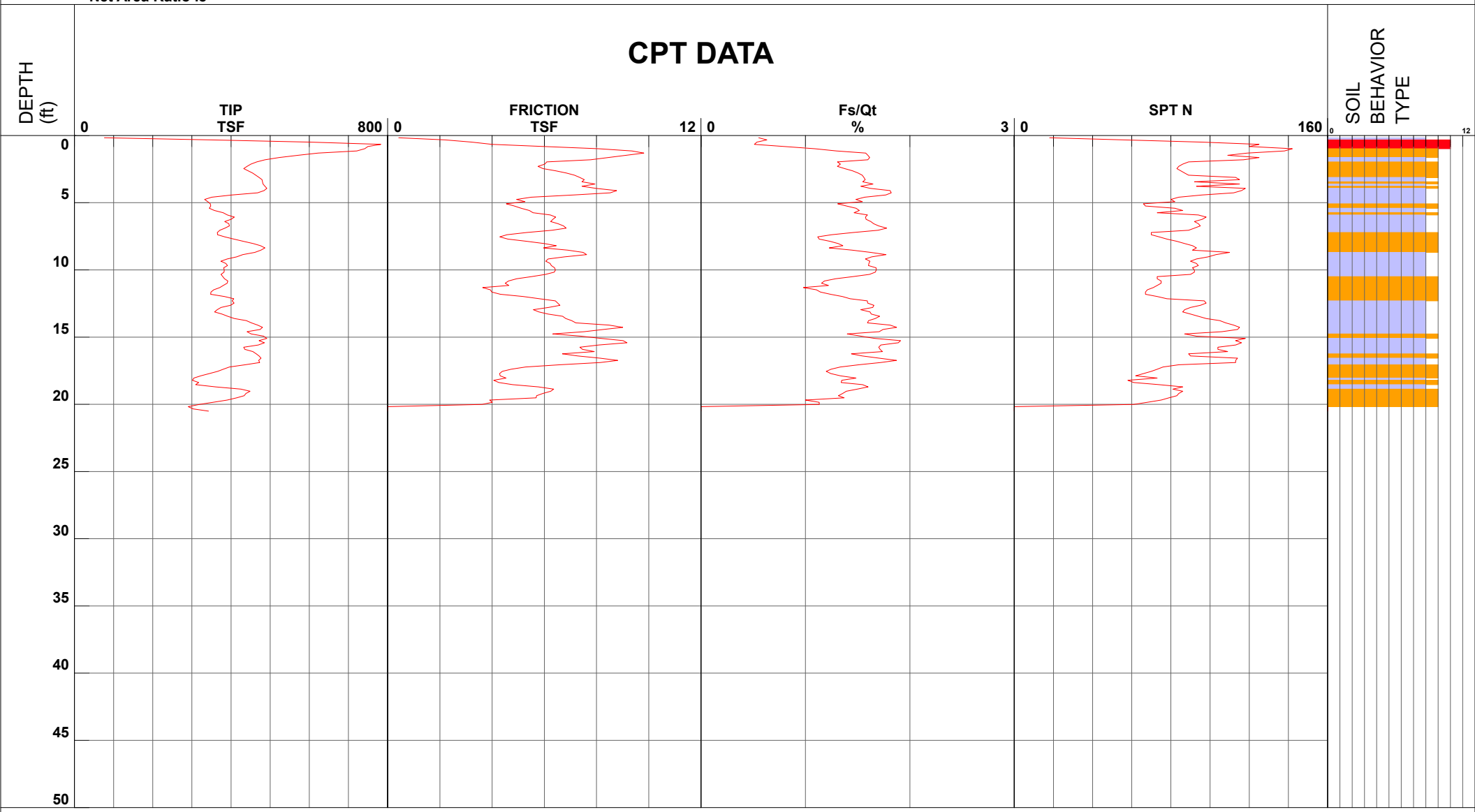
S*Soil behavior type and SPT based on data from UBC-1983

Earth Systems

Project	East Garrison Library	Operator	AJ-ER	Filename	SDF(062).cpt
Job Number	306389-001	Cone Number	DPG1556	GPS	
Hole Number	CPT-04	Date and Time	10/31/2023 8:37:00 AM	Maximum Depth	20.51 ft
EST GW Depth During Test		0.00 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Cone Size 15cm squared

S*Soil behavior type and SPT based on data from UBC-1983

Earth Systems Pacific

Boring B-1
PAGE 1 OF 2
FILE NO.: 306389-001
DATE: 10/19/2023

LOGGED BY: M. Arias
RIG TYPE: Mobile B-24
AUGER TYPE: 7" Hollow Stem Auger

East Garrison Branch Library
13993 Sherman Boulevard
Marina, California

DEPTH (feet)	USCS CLASS	SOIL DESCRIPTION	SAMPLE DATA: INTERVAL (feet)	SAMPLE NUMBER	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.	POCKET PEN (t.s.f)
0	SM	SILTY SAND; pale yellow , moist, fine grained sand							
1	SP	POORLY GRADED SAND; orangish brown , moist, very dense, medium grained sand						27	
2			1.5 - 2.0	1-1	■			35	
			2.0 - 2.5	1-2	■	115.8	4.4	39	
3								19	
4	SC	CLAYEY SAND; orange brown to strong brown, moist, dense, medium grained sand [Percentage Fines = 48]	3.5 - 4.0	1-3	■			21	
			4.0 - 4.5	1-4	■	119.7	7.0	23	
5									
6	SP	POORLY-GRADED SAND; orange brown, moist, dense, medium grained sand	5.5 - 6.0	1-5	■			8	
			6.0 - 6.5	1-6	■			13	
7								21	
8		- dark grayish brown							
9								14	
		- very moist						18	
10		- light gray (greenish gray) at bottom of the sample	8.5 - 10.0	1-7	■	109.6	8.6	20	
11									
12									
13		- yellowish brown sand							
14		- dark grayish brown						17	
		- very dense						21	
15			13.5 - 15.0	1-8	●			36	
16									
17									
18		- dark gray to black							
19								21	
								30	
20			18.5 - 20.0	1-9	●			34	
		- auger grinding, hard drilling							
21		- slightly easier drilling							
22		- grayish brown to strong brown							
23									
24		- brown						23	
								33	
25			23.0 - 25.0	1-10	●			33	
26		- grayish brown							
		- few fine gravel							

LEGEND: ■ 2.5" Mod Cal Sample ▭ Shelby ● SPT ○ Bulk Sample ▽ Groundwater

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring B-1
PAGE 2 OF 2
FILE NO.: 306389-001
DATE: 10/19/2023

LOGGED BY: M. Arias
RIG TYPE: Mobile B-24
AUGER TYPE: 7" Hollow Stem Auger

East Garrison Branch Library
13993 Sherman Boulevard
Marina, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA: INTERVAL (feet)	SAMPLE NUMBER	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.	POCKET PEN (t.s.f)
27	SP		POORLY-GRADED SAND; grayish brown, moist, very dense, medium grained sand, few fine gravel							
28										
29			- medium dense, orange brown						10 11	
30				28.5 - 30.0	1-11	●			10	
31			- dark gray with black and brown - dark gray, black rootlets present in cuttings	30.5 - 31.0	1-12	○				
32										
33										
34			- orange brown						8 10	
35				33.5 - 35.0	1-13	●			12	
36										
37										
38			- orange brown cuttings at the bottom of the drill bit, poorly graded sand							
39									11 12	
40				38.5 - 40.0	1-14	●			15	
41										
42										
43			- brown to orange brown							
44			- orange brown, medium to coarse sand, moist, medium to coarse sand						13 21	
45			- dense	43.5 - 45.0	1-15	●			23	
46										
47			- yellowish brown							
48										
49									8 19	
50				48.5 - 50.0	1-16	●			23	
51			Boring terminated at 50 feet. Groundwater was not encountered to the maximum depth of boring.							
52										
53										

LEGEND: ■ 2.5" Mod Cal Sample ▭ Shelby ● SPT ○ Bulk Sample ▼ Groundwater

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring B-2
PAGE 1 OF 1
FILE NO.: 306389-001
DATE: 10/19/2023

LOGGED BY: M. Arias
RIG TYPE: Mobile B-24
AUGER TYPE: 7" Solid Stem Auger

East Garrison Branch Library
13993 Sherman Boulevard
Marina, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA: INTERVAL (feet)	SAMPLE NUMBER	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.	POCKET PEN (t.s.f)
0	SM		SILTY SAND; pale yellow , moist, fine grained sand							
1	SP		POORLY GRADED SAND; orangish brown , moist, dense, medium grained sand						24	
2			- disturbed sample, partial recovery	2.0 - 2.5	2-1	■		5.0	28 33	
3									15	
4	SP-SC		POORLY-GRADED SAND with CLAY; dark brown, moist, dense, fine grained sand [Percentage Fines = 9]	3.5 - 4.0 4.0 - 4.5	2-2 2-3	■ ■	108.6	7.7	25 30	
5									12	
6			- very moist	5.5 - 6.5	2-4	■	113.2	9.3	25 32	
7										
8	SP		POORLY GRADED SAND; dark grayish brown to light gray, moist, dense to very dense, medium grained sand						20	
9				9.0 - 9.5	2-5	■	118.0	8.5	33	
10			- green/gray	9.5 - 10.0	2-6	■			37	
11										
12										
13										
14									19	
15				13.5 - 15.0	2-7	●			21 27	
16										
17			- orange brown							
18										
19									15	
20				18.5 - 20.0	2-8	●			21 25	
21			Boring terminated at 20 feet. Groundwater was not encountered to the maximum depth of boring.							
22										
23										
24										
25										
26										

LEGEND: ■ 2.5" Mod Cal Sample ▭ Shelby ● SPT ○ Bulk Sample ▽ Groundwater

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

BORING LOG LEGEND

SAMPLE / SUBSURFACE WATER SYMBOLS	GRAPH. SYMBOL
CALIFORNIA MODIFIED	
STANDARD PENETRATION TEST (SPT)	
SHELBY TUBE	
BULK	
SUBSURFACE WATER DURING DRILLING	
SUBSURFACE WATER AFTER DRILLING	

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2487)

MAJOR DIVISIONS	GROUP SYMBOL	TYPICAL DESCRIPTIONS	GRAPH. SYMBOL
COARSE GRAINED SOILS (MORE THAN HALF OF MATERIAL IS LARGER THAN #200 SIEVE SIZE)	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	
	GP	POORLY GRADED GRAVELS, OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	
	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES, NON-PLASTIC FINES	
	GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES, PLASTIC FINES	
	SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	
	SP	POORLY GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES	
	SM	SILTY SANDS, SAND-SILT MIXTURES, NON-PLASTIC FINES	
	SC	CLAYEY SANDS, SAND-CLAY MIXTURES, PLASTIC FINES	
FINE GRAINED SOILS (HALF OR MORE OF MATERIAL IS SMALLER THAN #200 SIEVE SIZE)	ML	INORGANIC SILTS AND VERY FINE SANDS, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY	
	CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS	
	OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	
	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS	
	CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS	
	OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS	
	PT	PEAT AND OTHER HIGHLY ORGANIC SOILS	

OBSERVED MOISTURE CONDITION

DRY	SLIGHTLY MOIST	MOIST	VERY MOIST	WET (SATURATED)

CONSISTENCY

COARSE GRAINED SOILS			FINE GRAINED SOILS		
BLOWS/FOOT		DESCRIPTIVE TERM	BLOWS/FOOT		DESCRIPTIVE TERM
SPT	CA SAMPLER		SPT	CA SAMPLER	
0-10	0-16	LOOSE	0-2	0-3	VERY SOFT
11-30	17-50	MEDIUM DENSE	3-4	4-7	SOFT
31-50	51-83	DENSE	5-8	8-13	MEDIUM STIFF
OVER 50	OVER 83	VERY DENSE	9-15	14-25	STIFF
			16-30	26-50	VERY STIFF
			OVER 30	OVER 50	HARD

GRAIN SIZES

U.S. STANDARD SERIES SIEVE				CLEAR SQUARE SIEVE OPENING		
# 200	# 40	# 10	# 4	3/4"	3"	12"

SILT & CLAY	SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	COARSE		

TYPICAL BEDROCK HARDNESS

MAJOR DIVISIONS	TYPICAL DESCRIPTIONS
EXTREMELY HARD	CORE, FRAGMENT, OR EXPOSURE CANNOT BE SCRATCHED WITH KNIFE OR SHARP PICK; CAN ONLY BE CHIPPED WITH REPEATED HEAVY HAMMER BLOWS
VERY HARD	CANNOT BE SCRATCHED WITH KNIFE OR SHARP PICK; CORE OR FRAGMENT BREAKS WITH REPEATED HEAVY HAMMER BLOWS
HARD	CAN BE SCRATCHED WITH KNIFE OR SHARP PICK WITH DIFFICULTY (HEAVY PRESSURE); HEAVY HAMMER BLOW REQUIRED TO BREAK SPECIMEN
MODERATELY HARD	CAN BE GROOVED 1/16 INCH DEEP BY KNIFE OR SHARP PICK WITH MODERATE OR HEAVY PRESSURE; CORE OR FRAGMENT BREAKS WITH LIGHT HAMMER BLOW OR HEAVY MANUAL PRESSURE
SOFT	CAN BE GROOVED OR GOUGED EASILY BY KNIFE OR SHARP PICK WITH LIGHT PRESSURE, CAN BE SCRATCHED WITH FINGERNAIL; BREAKS WITH LIGHT TO MODERATE MANUAL PRESSURE
VERY SOFT	CAN BE READILY INDENTED, GROOVED OR GOUGED WITH FINGERNAIL, OR CARVED WITH KNIFE; BREAKS WITH LIGHT MANUAL PRESSURE

TYPICAL BEDROCK WEATHERING

MAJOR DIVISIONS	TYPICAL DESCRIPTIONS
FRESH	NO DISCOLORATION, NOT OXIDIZED
SLIGHTLY WEATHERED	DISCOLORATION OR OXIDATION IS LIMITED TO SURFACE OF, OR SHORT DISTANCE FROM, FRACTURES: SOME FELDSPAR CRYSTALS ARE DULL
MODERATELY WEATHERED	DISCOLORATION OR OXIDATION EXTENDS FROM FRACTURES, USUALLY THROUGHOUT; Fe-Mg MINERALS ARE "RUSTY", FELDSPAR CRYSTALS ARE "CLOUDY"
INTENSELY WEATHERED	DISCOLORATION OR OXIDATION THROUGHOUT; FELDSPAR AND Fe-Mg MINERALS ARE ALTERED TO CLAY TO SOME EXTENT, OR CHEMICAL ALTERATION PRODUCES IN SITU DISAGGREGATION
DECOMPOSED	DISCOLORATION OR OXIDATION THROUGHOUT, BUT RESISTANT MINERALS SUCH AS QUARTZ MAY BE UNALTERED; FELDSPAR AND Fe-Mg MINERALS ARE COMPLETELY ALTERED TO CLAY

drafting/masters/Boring Log Legend121714.dwg

APPENDIX B

Geotechnical Laboratory Test Results
CERCO Analytical Corrosivity Test Results

East Garrison Branch Library

306389-001

RESISTANCE '*R*' VALUE AND EXPANSION PRESSURE

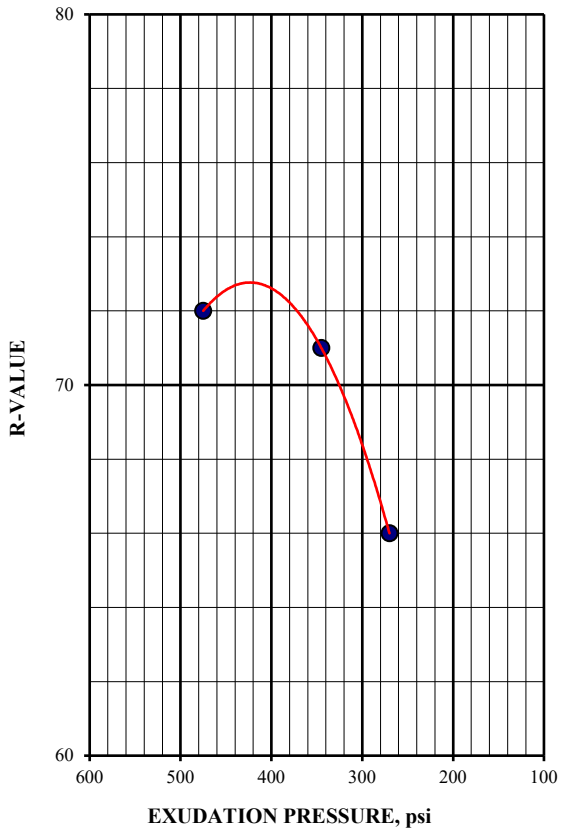
ASTM D 2844/D2844M-18

November 30, 2023

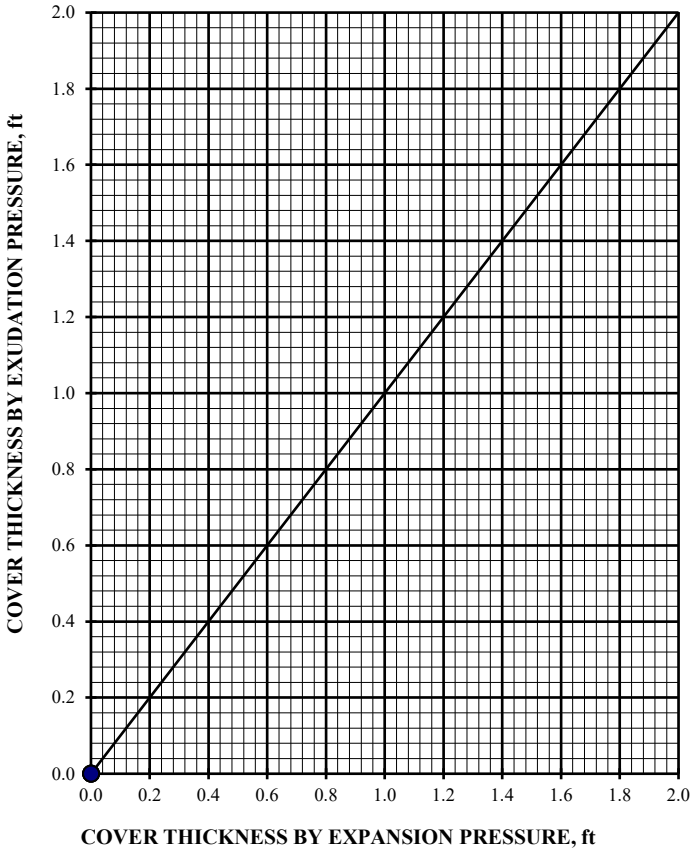
Bag A - CPT 3 @ 0.0 - 4.0'
Brown Poorly Graded Sand (SP)

Dry Density @ 300 psi Exudation Pressure: 111.6-pcf
%Moisture @ 300 psi Exudation Pressure: 11.6%
R-Value - Exudation Pressure: 68
R-Value - Expansion Pressure: N/A
R-Value @ Equilibrium: 68

EXUDATION PRESSURE CHART



EXPANSION PRESSURE CHART



East Garrison Branch Library 306389-001

BULK DENSITY TEST RESULTS

ASTM D 2937-17 (modified for ring liners)

October 26, 2023

BORING NO.	DEPTH feet	MOISTURE CONTENT, %	WET DENSITY, pcf	DRY DENSITY, pcf
B 1-2	2.0 - 2.5	4.4	120.8	115.8
B 1-4	4.0 - 4.5	7.0	128.2	119.7
B 1-7	9.5 - 10.0	8.6	119.0	109.6
B 1-8	13.5 - 14.0	8.7	129.7	119.4
B 1-5	5.5 - 6.0	7.4	114.0	106.2
B 2-1	2.0 - 2.5	5.0	---	---
B 2-2	3.5 - 4.0	7.7	117.0	108.6
B 2-4	6.0 - 6.5	9.3	123.7	113.2
B 2-5	9.0 - 9.5	8.5	128.1	118.0

East Garrison Branch Library 306389-001

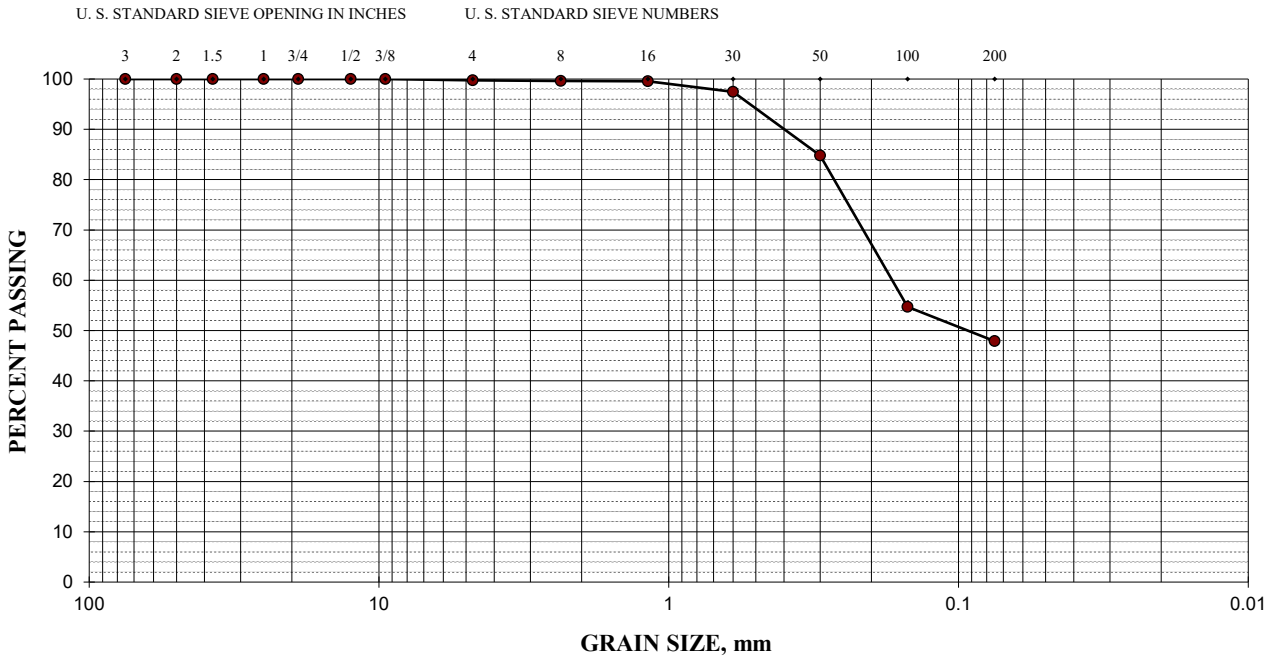
PARTICLE SIZE ANALYSIS

ASTM D 422-63/07; D 1140-17

Boring B1-3 @ 3.5 - 4.0' October 26, 2023

Clayey Sand (SC)

Sieve size	% Retained	% Passing
3" (75-mm)	0	100
2" (50-mm)	0	100
1.5" (37.5-mm)	0	100
1" (25-mm)	0	100
3/4" (19-mm)	0	100
1/2" (12.5-mm)	0	100
3/8" (9.5-mm)	0	100
#4 (4.75-mm)	0	100
#8 (2.36-mm)	0	100
#16 (1.18-mm)	0	100
#30 (600-µm)	3	97
#50 (300-µm)	15	85
#100 (150-µm)	45	55
#200 (75-µm)	52	48



East Garrison Branch Library 306389-001

PARTICLE SIZE ANALYSIS

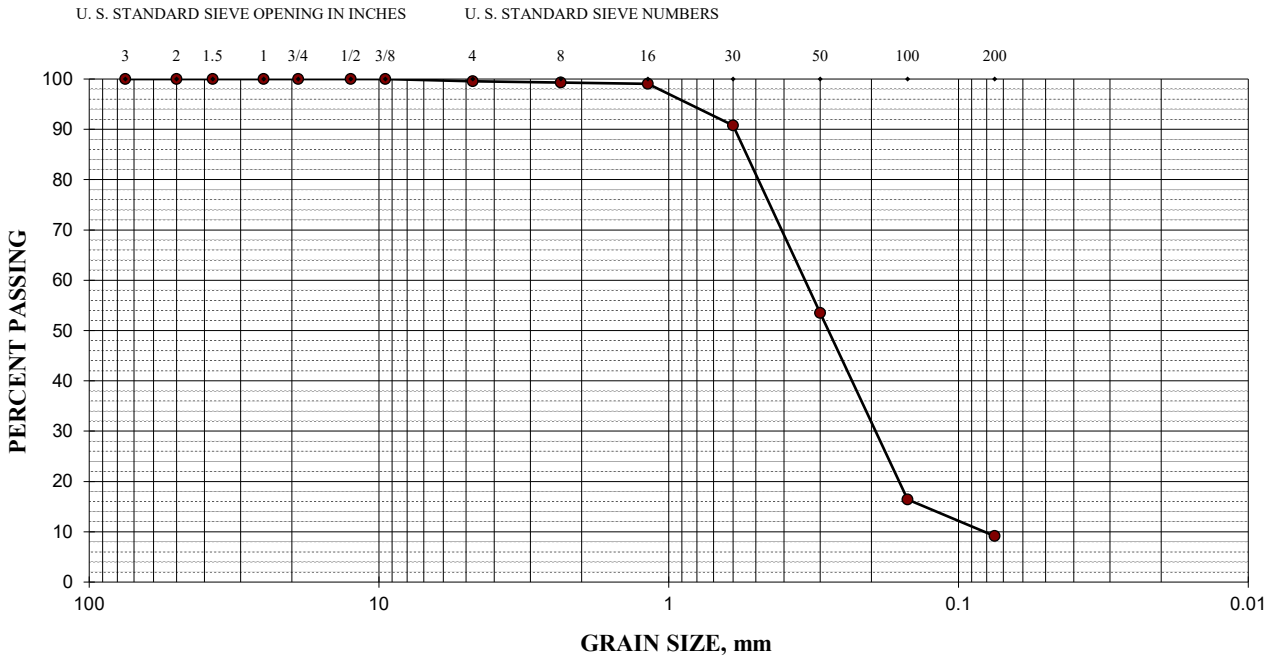
ASTM D 422-63/07; D 1140-14

Boring B2-3 @ 4.0 - 4.5' October 26, 2023

Poorly Graded Sand with Clay (SP-SC)

Cu = 4.2; Cc = 1.4

Sieve size	% Retained	% Passing
3" (75-mm)	0	100
2" (50-mm)	0	100
1.5" (37.5-mm)	0	100
1" (25-mm)	0	100
3/4" (19-mm)	0	100
1/2" (12.5-mm)	0	100
3/8" (9.5-mm)	0	100
#4 (4.75-mm)	0	100
#8 (2.36-mm)	1	99
#16 (1.18-mm)	1	99
#30 (600-µm)	9	91
#50 (300-µm)	47	53
#100 (150-µm)	84	16
#200 (75-µm)	91	9



CERCO analytical
1100 Willow Pass Court, Suite A
Concord, CA 94520-1006
925 462 2771 Fax. 925 462 2775
www.cercoanalytical.com

29 December, 2023

Job No. 2312047
Cust. No. 13342

Ms. Maggy Arias
Earth Systems
1514 Moffett Street, Suite A
Salinas, CA 93905

Subject: Project No.: 306389-001
Project Name: Proposed East Garrison Library
Corrosivity Analysis – ASTM Test Methods

Dear Ms. Arias:

Pursuant to your request, CERCO Analytical has analyzed the soil sample submitted on December 26, 2023. Based on the analytical results, this brief corrosivity evaluation is enclosed for your consideration.

Based upon the resistivity measurement, the sample is classified as "mildly corrosive". All buried iron, steel, cast iron, ductile iron, galvanized steel and dielectric coated steel or iron should be properly protected against corrosion depending upon the critical nature of the structure. All buried metallic pressure piping such as ductile iron firewater pipelines should be protected against corrosion.

The chloride ion concentration reflects none detected with a reporting limit of 15 mg/kg.

The sulfate ion concentration reflects none detected with a reporting limit of 15 mg/kg.

The pH of the soil is 7.33, which does not present corrosion problems for buried iron, steel, mortar-coated steel and reinforced concrete structures.

The redox potential is 110-mV and is indicative of potentially "moderately corrosive" soil resulting from anaerobic soil conditions.

This corrosivity evaluation is based on general corrosion engineering standards and is non-specific in nature. For specific long-term corrosion control design recommendations or consultation, please call *JDH Corrosion Consultants, Inc. at (925) 927-6630*.

We appreciate the opportunity of working with you on this project. If you have any questions, or if you require further information, please do not hesitate to contact us.

Very truly yours,
CERCO ANALYTICAL, INC.

for

J. Darby Howard, Jr., P.E.
President

JDH/jdl
Enclosure

CERCO analytical
1100 Willow Pass Court, Suite A
Concord, CA 94520-1006
925 462 2771 Fax. 925 462 2775
www.cercoanalytical.com

Client: Earth Systems Pacific
Client's Project No.: 306389-001
Client's Project Name: Proposed East Garrison Library
Date Sampled: 3-Oct-23
Date Received: 26-Dec-23
Matrix: Soil
Authorization: Signed Chain of Custody

Date of Report: 29-Dec-2023

Job/Sample No.	Sample I.D.	Redox (mV)	pH	Conductivity (umhos/cm)*	Resistivity (100% Saturation) (ohms-cm)	Sulfide (mg/kg)*	Chloride (mg/kg)*	Sulfate (mg/kg)*
2312047-001	1-1	110	7.33	-	30,000	-	N.D.	N.D.

Method:	ASTM D1498	ASTM D4972	ASTM D1125M	ASTM G57	ASTM D4658M	ASTM D4327	ASTM D4327
Reporting Limit:	-	-	10	-	50	15	15
Date Analyzed:	27-Dec-2023	28-Dec-2023	-	27-Dec-2023	-	28-Dec-2023	28-Dec-2023

Julia Clauson
Chemist

* Results Reported on "As Received" Basis
N.D. - None Detected

Quality Control Summary - **All laboratory quality control parameters were found to be within established limits**

APPENDIX C

Table of Site-Specific Ground Motion Spectra

Table C-1
Fault Parameters

Fault Section Name	Distance (miles)	Distance (km)	Upper Seis. Depth (km)	Lower Seis. Depth (km)	Avg Dip Angle (deg.)	Avg Dip Direction (deg.)	Avg Rake (deg.)	Trace Length (km)	Fault Type	**Mean Mag**	Mean Return Interval (years)	Slip Rate (mm/yr)
Reliz 2011 CFM FM3.1, 3.2	0.5	0.8	0.0	10.9	58	240	na	127	B'	**7.4**		
Monterey Bay-Tularcitos FM3.1, 3.2	8.8	14.1	0.0	14.0	90	49	150	86	B	**7.3**		0.5
Zayante-Vergeles FM3.2	12.9	20.7	0.0	12.0	90	36	150	58	B	**7.0**		0.1
Zayante-Vergeles 2011 CFM, FM3.1	13.8	22.2	0.0	11.8	30	211	na	90	B'	**7.5**		
San Andreas (Santa Cruz Mtn) FM3.1, 3.2	17.1	27.5	0.0	15.0	79	42	180	63	A	**7.6**	219	24
San Gregorio (South) 2011 CFM FM3.1, 3.2	17.2	27.7	0.0	11.6	75	66	180	90	B'	**7.2**		
San Andreas (Creeping Section) FM3.1, 3.2	17.6	28.3	0.0	12.0	90	227	180	121	A	**6.8**	89	9
Sargent 2011 CFM FM3.1, 3.2	21.4	34.4	0.0	12.0	90	na	na	57	B'	**6.9**		
Calaveras (So) 2011 CFM FM3.1, 3.2	22.6	36.4	0.0	9.5	85	71	180	26	A	**6.0**	20	6
Calaveras (So) - Paicines extension FM3.1, 3.2	22.6	36.4	0.0	13.0	77	na	na	60	B'	**7.0**		
Quien Sabe 2011 CFM FM3.1, 3.2	27.5	44.3	0.0	10.1	85	54	180	25	B	**6.5**		1
San Gregorio (North) 2011 CFM FM3.1, 3.2	28.2	45.5	0.0	11.6	90	248	180	129	B'	**7.3**		
Calaveras (Central) 2011 CFM FM3.1, 3.2	30.2	48.6	0.0	11.0	77	239	180	52	A	**6.4**	39	#N/A
Butano 2011 CFM FM3.1, 3.2	33.9	54.6	0.0	12.0	70	na	na	46	B'	**6.9**		
Hosgri FM3.1, 3.2	35.1	56.5	0.0	6.8	80	59	180	171	B	**7.3**		2.5
Silver Creek 2011 CFM FM3.1, 3.2	36.2	58.3	0.0	11.1	75	na	na	48	B'	**6.8**		
Monte Vista-Shannon 2011 CFM FM3.1, 3.2	37.3	60.0	0.0	14.2	61	215	90	60	B	**6.4**		0.4
San Andreas (Peninsula) FM3.1, 3.2	38.9	62.5	0.0	13.0	90	54	180	100	A	**7.9**	354	34
Hayward (So) extension FM3.1, 3.2	40.2	64.6	0.0	5.1	48	na	na	23	B'	**6.3**		
Rinconada 2011 CFM FM3.1, 3.2	40.9	65.8	0.0	8.5	82	233	180	123	B	**7.5**		1
Ortigalita (South) FM3.1, 3.2	42.0	67.7	0.0	11.0	90	na	na	62	B'	**6.9**		
Greenville (So) FM3.1, 3.2	43.9	70.6	0.0	10.6	87	242	180	29	B'	**6.6**		
Ortigalita (North) FM3.1, 3.2	45.0	72.4	0.0	11.0	90	240	180	40	B	**7.0**		1
Great Valley 8 V	51.0	82.1	7.0	9.6	15	249	90	41	B	**6.7**		1.5
Pilarcitos 2011 CFM FM3.1, 3.2	51.2	82.4	0.0	9.5	81	na	na	51	B'	**6.8**		
Hayward (So) FM3.1, 3.2	51.4	82.7	0.0	13.4	76	52	180	54	A	**6.8**	89	6
Great Valley 9 Laguna Seca FM3.1, 3.2	51.6	83.0	7.0	9.6	15	237	90	39	B	**6.7**		1.5
Great Valley 10 Panoche FM3.1, 3.2	54.9	88.3	7.0	9.6	15	242	90	22	B	**6.4**		1.5
Calaveras (No) 2011 CFM FM3.1, 3.2	55.5	89.4	0.0	14.0	80	247	180	48	A	**6.9**	179	15
Mission (connected)FM3.1, 3.2	55.5	89.4	0.0	5.1	90	na	na	28	B'	**6.2**		
Greenville (No) 2011 CFM FM3.1, 3.2	59.8	96.2	0.0	14.9	84	236	180	51	B'	**7.0**		
Great Valley 11 FM3.1, 3.2	59.9	96.3	7.0	9.6	15	221	90	24	B	**6.5**		1.5
Great Valley 7 FM3.1, 3.2	63.6	102.3	7.0	9.6	15	224	90	45	B	**6.8**		1.5
Las Positas FM3.1, 3.2	65.9	106.1	0.0	15.0	90	na	na	15	B'	**6.4**		
Great Valley 12 FM3.1, 3.2	72.8	117.2	7.0	9.6	15	243	90	17	B	**6.3**		1.5
Oceanic-West Huasna FM3.1, 3.2	72.9	117.4	0.0	7.0	58	49	na	122	B'	**7.1**		
Mount Diablo Thrust South, FM3.1	73.9	118.9	1.0	13.5	40	na	na	11	B'	**6.4**		
Mount Diablo Thrust FM3.2	74.4	119.7	8.0	16.0	38	41	90	25	B	**6.6**		2
Mount Diablo Thrust North CFM, FM3.1	77.8	125.2	1.0	13.5	40	na	na	19	B'	**6.7**		
Great Valley 13 (Coalinga) FM3.1, 3.2	79.1	127.3	9.1	15.2	15	226	90	32	B	**7.0**		1.5

Reference: USGS OFR 2013-1165 (CGS SP 228) Based on Site Coordinates of 36.65493 Latitude, -121.73336 Longitude

Mean Magnitude for Type A Faults based on 0.1 weight for unsegmented section, 0.9 weight for segmented model (weighted by probability of each scenario with section listed as given on Table 3 of Appendix G in OFR 2008-1437). Mean magnitude is average of Ellworths-B and Hanks & Bakun moment area relationship.

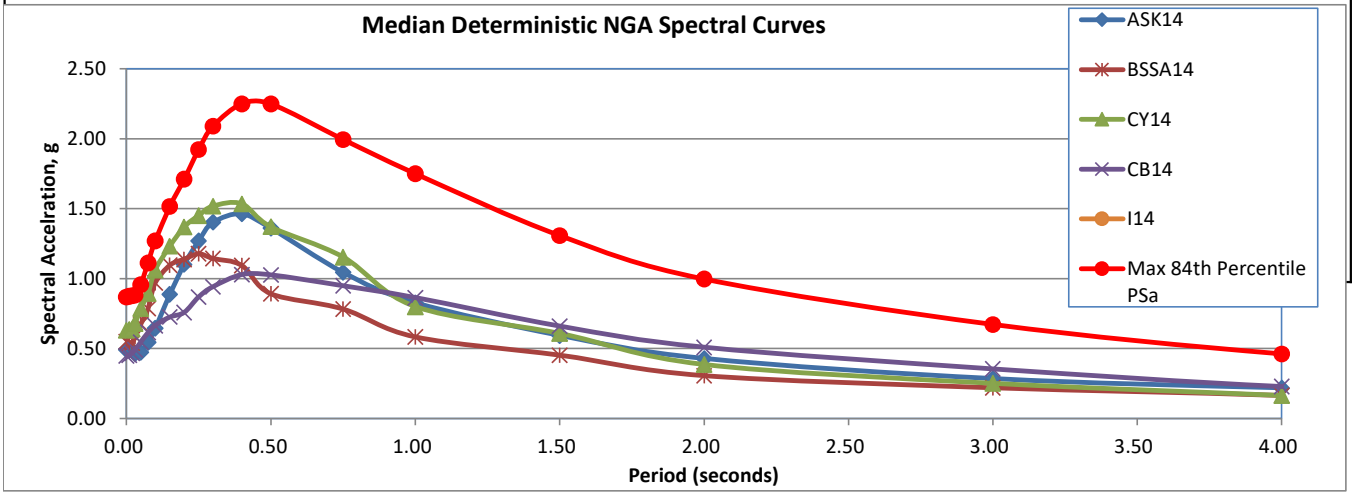
36.6549 -121.73336 Lat/Long

Table C-2 - Deterministic Spectral Response Values
Deterministic NGA Response Spectra for Largest Median Earthquake Ground Motion

Average of NGA: Abrahamson - Silva - Kamai (2014), Boore - Stewart - Seyhan - Atkinson (2013), Campbell-Bozorgnia (2013), Chiou - Youngs (2014), and Idriss (2013)

Mean Spectra Response from Attentuation Relationships

Input Variables	ASK14		BSSA14	CB14	CY14	I14	Average			
	Period (sec)	Median PSa (g)	Median PSa (g)	Median PSa (g)	Median PSa (g)	Median PSa (g)	Period (sec)	Mean PSa (g)	Max 84th Percentile PSa (g)	Max Rotated Determ. PSa
	Weight:	**0.25**	**0.25**	**0.25**	**0.25**	**0.00**				
M 7.44	**0.00**	0.49	0.54	0.45	0.63	-	**0.00**	0.528	0.868	**0.954**
R_{RUP} 0.70	**0.01**	0.49	0.55	0.45	0.63	-	**0.01**	0.531	0.874	**0.961**
R_{JB} 0.00	**0.02**	0.49	0.54	0.47	0.63	-	**0.02**	0.532	0.879	**0.967**
V_{S30} 270	**0.03**	0.46	0.54	0.49	0.64	-	**0.03**	0.533	0.882	**0.971**
F_{RV} 0	**0.05**	0.47	0.58	0.55	0.68	-	**0.05**	0.570	0.956	**1.052**
F_{NM} 0	**0.075**	0.54	0.67	0.61	0.79	-	**0.075**	0.654	1.113	**1.224**
W 12.90	**0.10**	0.64	0.79	0.66	0.89	-	**0.10**	0.747	1.269	**1.396**
Z_{TOR} 0.00	**0.15**	0.89	0.97	0.73	1.06	-	**0.15**	0.911	1.515	**1.667**
Z_{BOT} 10.90	**0.20**	1.10	1.10	0.76	1.23	-	**0.20**	1.046	1.711	**1.882**
dip 58	**0.25**	1.27	1.14	0.87	1.37	-	**0.25**	1.161	1.922	**2.205**
	0.30	1.40	1.18	0.94	1.45	-	**0.30**	1.243	2.090	**2.418**
	0.40	1.46	1.14	1.03	1.52	-	**0.40**	1.288	2.250	**2.650**
	0.50	1.36	1.09	1.03	1.53	-	**0.50**	1.254	2.249	**2.695**
	0.75	1.04	0.89	0.95	1.37	-	**0.75**	1.064	1.995	**2.492**
	1.00	0.83	0.78	0.86	1.15	-	**1.00**	0.907	1.751	**2.276**
	1.50	0.59	0.58	0.66	0.80	-	**1.50**	0.659	1.307	**1.732**
	2.00	0.43	0.45	0.51	0.61	-	**2.00**	0.499	0.997	**1.346**
	3.00	0.28	0.31	0.35	0.39	-	**3.00**	0.333	0.671	**0.939**
	4.00	0.22	0.22	0.23	0.25	-	**4.00**	0.229	0.461	**0.668**
	5.00	0.17	0.16	0.16	0.16	-	**5.00**	0.164	0.330	**0.495**
	7.50	0.09	0.08	0.07	0.07	-	**7.50**	0.078	0.155	**0.232**
	10.00	0.06	0.05	0.04	0.04	-	**10.00**	0.045	0.088	**0.132**



36.65493 -121.73336 Lat/Long

Table C-3 - Site Specific Spectral Response Values
Probabilistic and Deterministic Response Spectra for MCE compared to Code Spectra
for 5% Viscous Damping Ratio

Natural Period T (seconds)	GeoMean Probab. 2% in 50 year MCE Spectrum (1) 2475-year (ASCE 21.2.1)	Max Rotated Probab. 2% in 50 year MCEr Spectrum (2) 2475-year (ASCE 21.2.1.1)	Max Rotated 84th Percentile Determ. MCE Spectrum (3) (ASCE 21.2.2)	Determ. Lower Limit MCE Spectrum (4) (3) * 1.00=Scaling (ASCE 21.2.2)	Determ. MCE Spectrum (5) Max (3),(4) (ASCE 21.2.2)	Site Specific MCE, Ground Response (SaM) (6) Min (2),(5) (ASCE 21.2.3)	Site Specific MCE Spectrum Comparator (6b) Max (6),1.5*(8) (ASCE 21.2.3)	2022 CBC MCE Spectrum (7)	Site Specific Design Spectrum (Sa) (8) (ASCE 21.3)	2022 CBC Design Spectrum (9) 2/3*(7)
0.00	0.736	0.779	0.954	0.954	0.954	0.779	0.779	0.604	0.519	0.402
0.05	1.025	1.084	1.052	1.052	1.052	1.052	1.052	0.858	0.701	0.572
0.10	1.313	1.390	1.396	1.396	1.396	1.390	1.390	1.112	0.927	0.742
0.15	1.555	1.645	1.667	1.667	1.667	1.645	1.645	1.367	1.097	0.911
0.20	1.726	1.826	1.882	1.882	1.882	1.826	1.826	1.509	1.217	1.006
0.30	1.893	2.102	2.418	2.418	2.418	2.102	2.102	1.509	1.401	1.006
0.40	1.817	2.048	2.650	2.650	2.650	2.048	2.048	1.509	1.365	1.006
0.50	1.759	2.010	2.695	2.695	2.695	2.010	2.010	1.509	1.340	1.006
0.75	1.391	1.647	2.492	2.492	2.492	1.647	1.647	1.509	1.098	1.006
1.00	1.131	1.384	2.276	2.276	2.276	1.384	1.384	1.343	0.922	0.895
1.50	0.826	1.030	1.732	1.732	1.732	1.030	1.030	0.895	0.686	0.597
2.00	0.609	0.774	1.346	1.346	1.346	0.774	0.774	0.671	0.516	0.448
3.00	0.400	0.527	0.939	0.939	0.939	0.527	0.527	0.448	0.351	0.298
4.00	0.294	0.401	0.668	0.668	0.668	0.401	0.401	0.336	0.267	0.224
5.00	0.228	0.321	0.495	0.495	0.495	0.321	0.321	0.269	0.214	0.179
8.00	0.129	0.182	0.277	0.277	0.277	0.182	0.182	0.168	0.122	0.112
10.00	0.089	0.126	0.132	0.132	0.132	0.126	0.126	0.134	0.084	0.090
12.00	0.062	0.087	0.072	0.072	0.072	0.072	0.090	0.112	0.060	0.075

C_{RS}:	0.962	
C_{R1}:	0.941	
Site Specific To:	0.170	$= 0.2*S_{D1}/S_{DS}$
Site Specific Ts:	0.849	$= S_{D1}/S_{DS}$

The value of Fa used in Column (3) is defined within ASCE 21.2.2 Supplement 1. This Fa value only applies within Column (3).

Site Coefficients	
F_{PGA}	1.10
F_a	1.00
F_v	2.50

Mapped MCE Acceleration Values		
PGA	0.614	g
S_S	1.509	g
S_1	0.537	g

Seismic Site Class	**D**
Risk Category	**II**

Site-Specific Design Acceleration Values		
PGA_M	**0.736**	**g**
S_{DS}	**1.261**	**g**
S_{D1}	**1.071**	**g**

Probabilistic spectrum from 2014 USGS Ground Motion Mapping Program adjusted for site conditions and scaled to represent maximum response in a horizontal plane, in accordance with ASCE 7-16 Section 21.2

Risk Coefficients have been applied to Column (2); If Method 1 was utilized the Risk Coefficients, CRS and CR1 are presented above, if Method 2 was utilized the Risk Coefficients were obtained from the USGS Risk Targeted Ground Motion Calculator (https://earthquake.usgs.gov/designmaps/rtgm).

Reference: ASCE 7-16, Chapters 21.2, 21.3, 21.4, 21.5, 11.4, and 11.8

Calculation Utilized ASCE7-16, Section 21.2.1.1 - Method 1

Short-Period Seismic Design Category:	1-Second Period Seismic Design Category:
D	D

Vertical Coefficient (C_V)
1.40

Deterministic Fault Parameters			
Reliz 2011 CFM FM3.1, 3.2		R_{JB} (km)	0.0
Magnitude	7.44	R_{RUP} (km)	0.7
Distance (km)	0.8	Z_{TOR} (km)	0.0
Width (km)	12.9	Z_{BOT} (km)	10.9
Dip (Deg.)	58	V_{S30} (m/s)	270

Site-Specific MCE_R, 5% damped, Spectral Response Acceleration Parameter		
S_{MS}	**1.892**	**g**
S_{M1}	**1.606**	**g**

1 g = 980.6 cm/sec^2 =32.2 ft/sec^2

PSV (ft/sec) = $32.2(S_a)T/(2p)$

Key: Probab. = Probabilistic, Determ. = Deterministic, MCE = Maximum Considered Earthquake

APPENDIX D

Liquefaction Analysis

GeoLogismiki
Geotechnical Engineers
Merarhias 56
http://www.geologismiki.gr

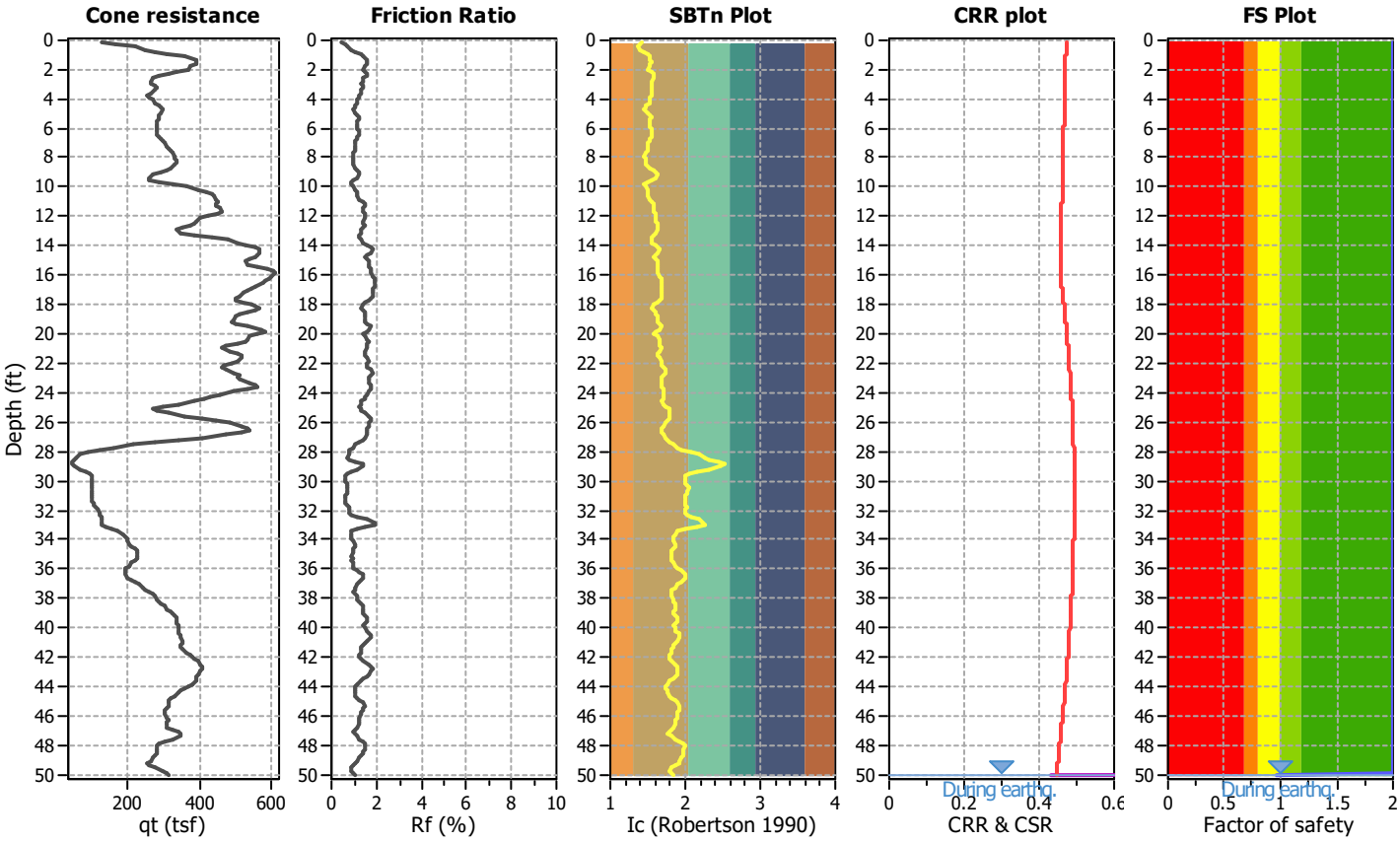
LIQUEFACTION ANALYSIS REPORT

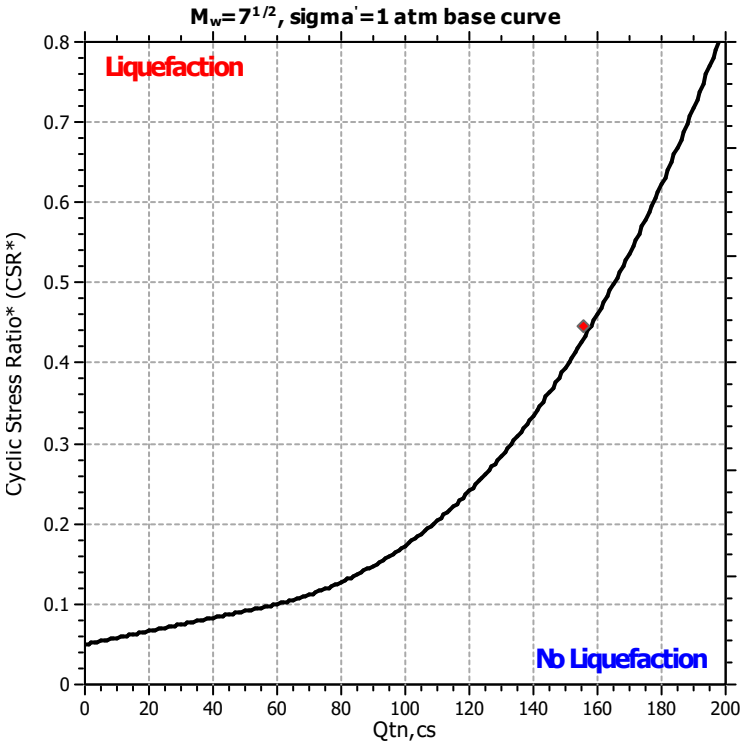
Project title : East Garrison Branch Library **Location : Marina, CA**

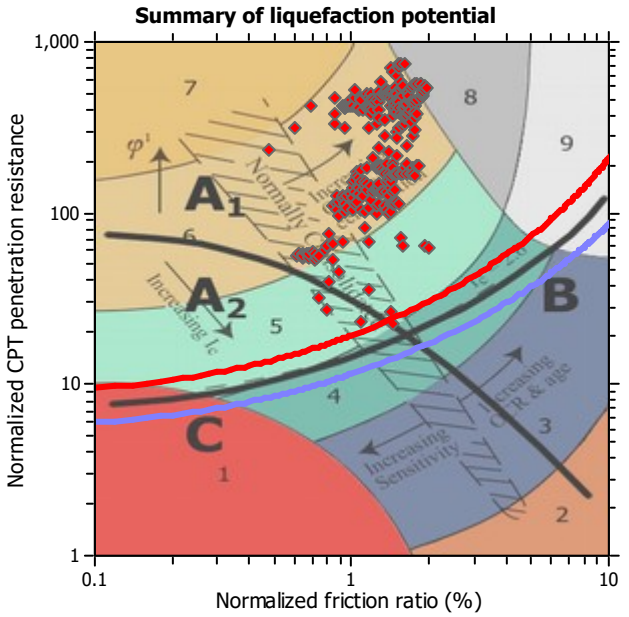
CPT file : CPT-03 - Basic

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	50.00 ft	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	50.00 ft	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	60.00 ft
Earthquake magnitude M_w:	7.44	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.74	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

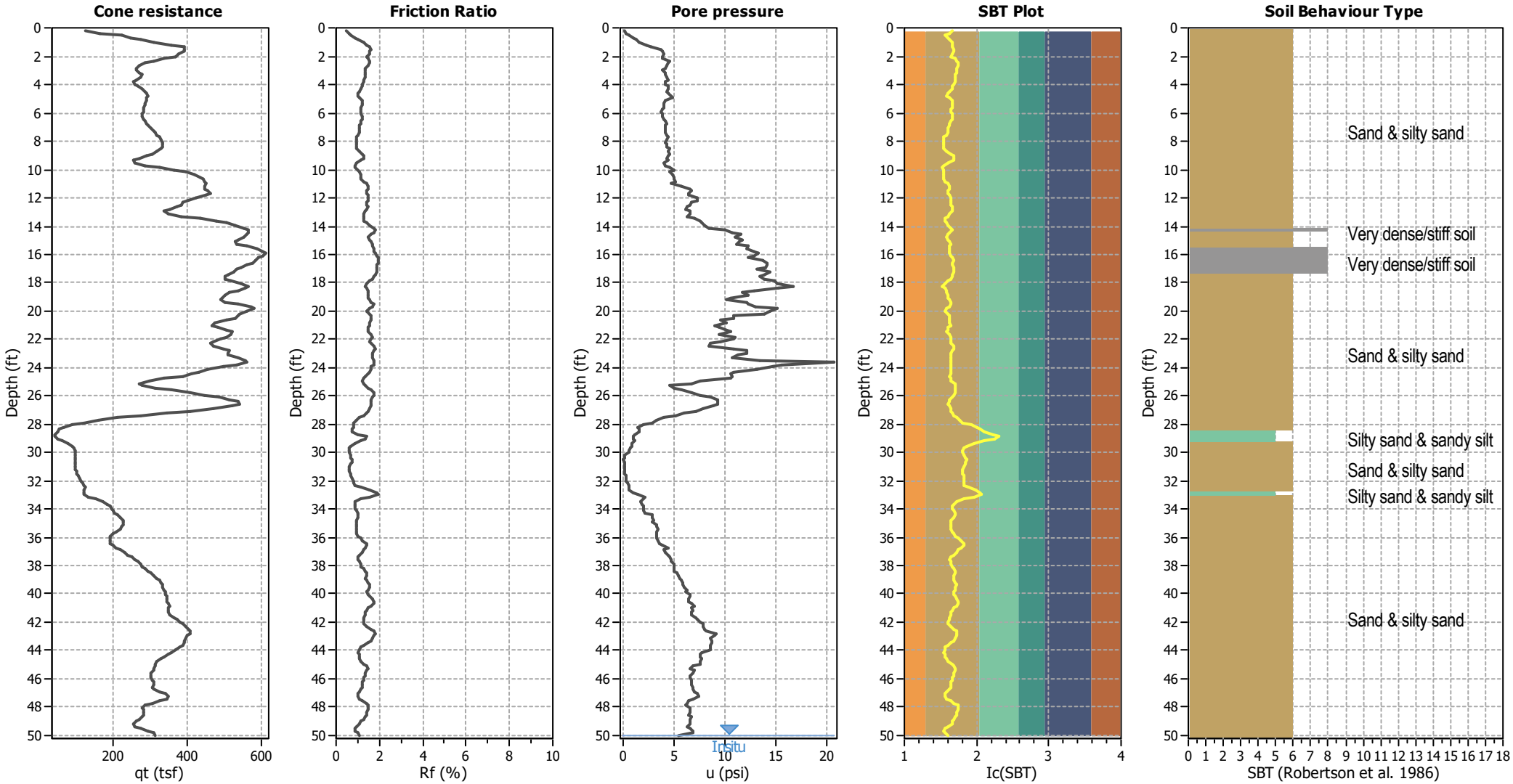






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



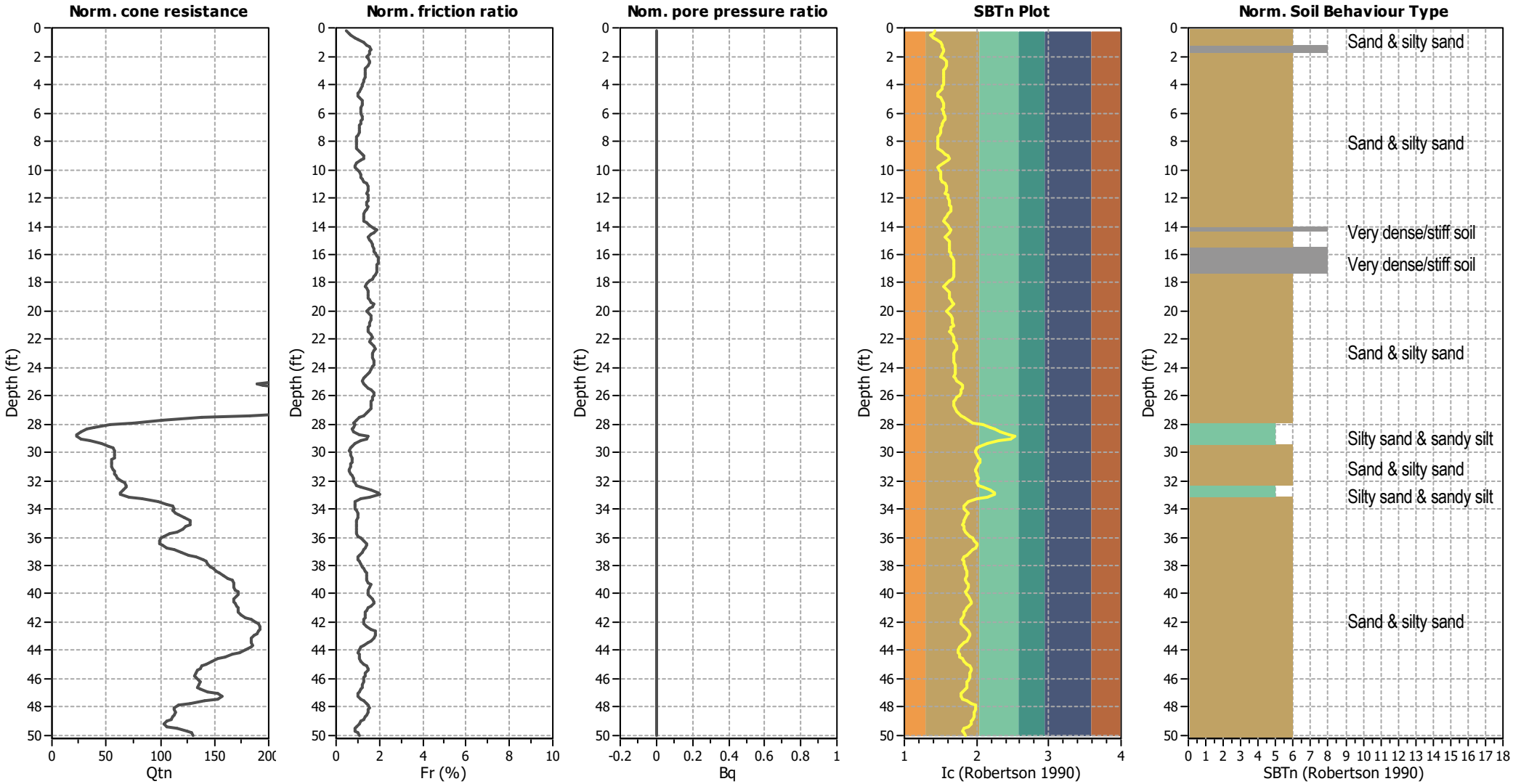
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.44	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.74	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



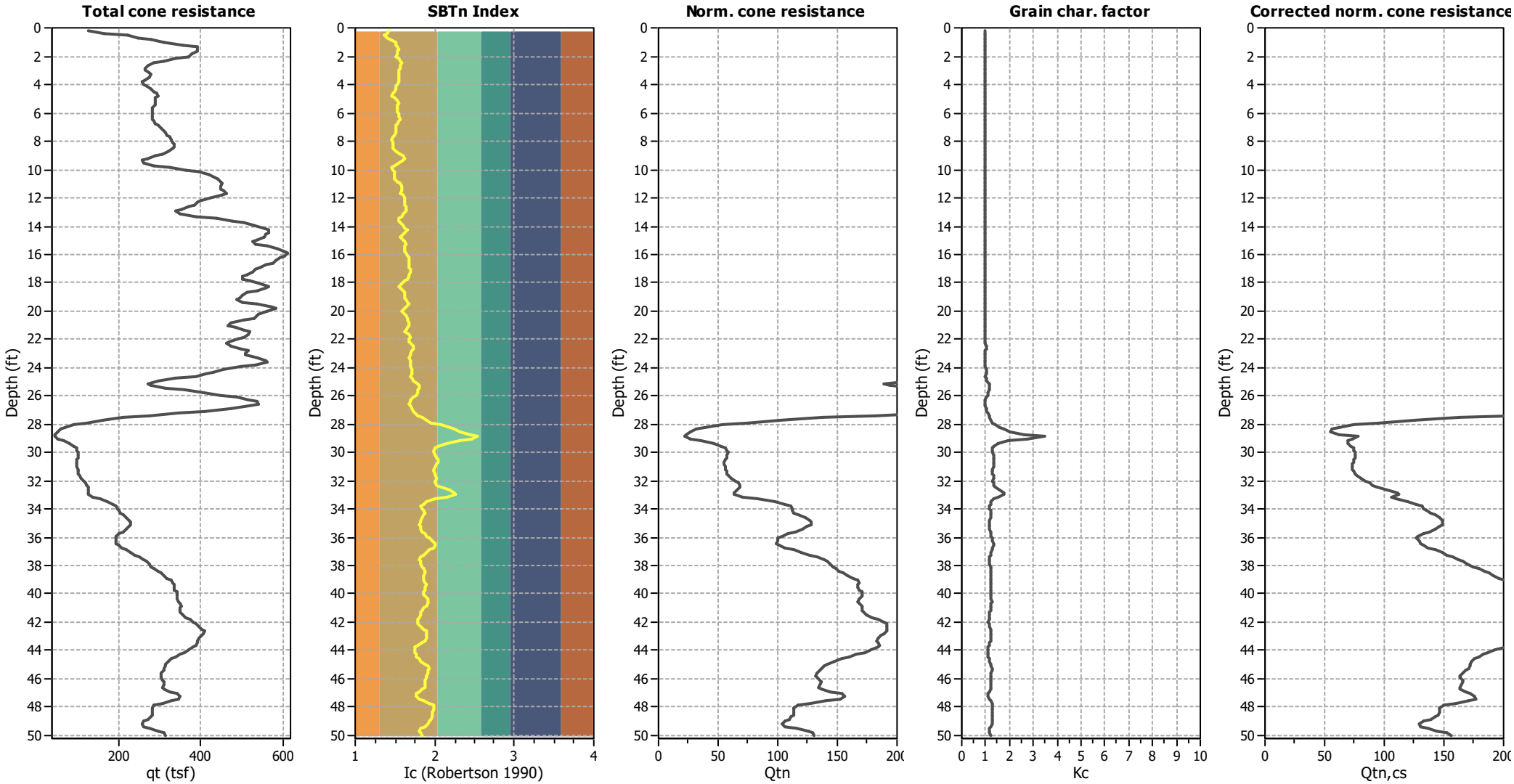
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.44	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.74	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

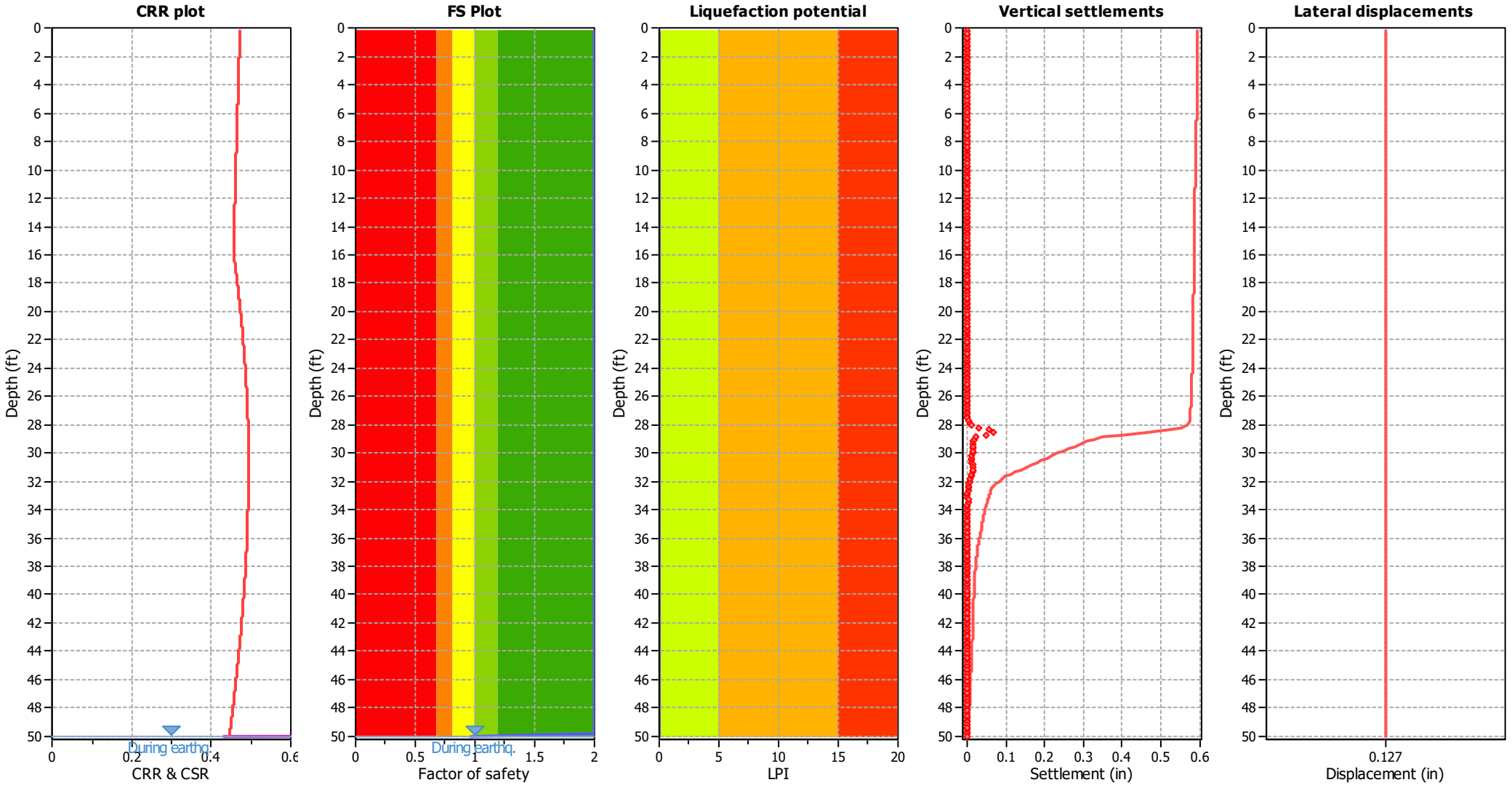
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.44	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.74	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.44	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.74	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

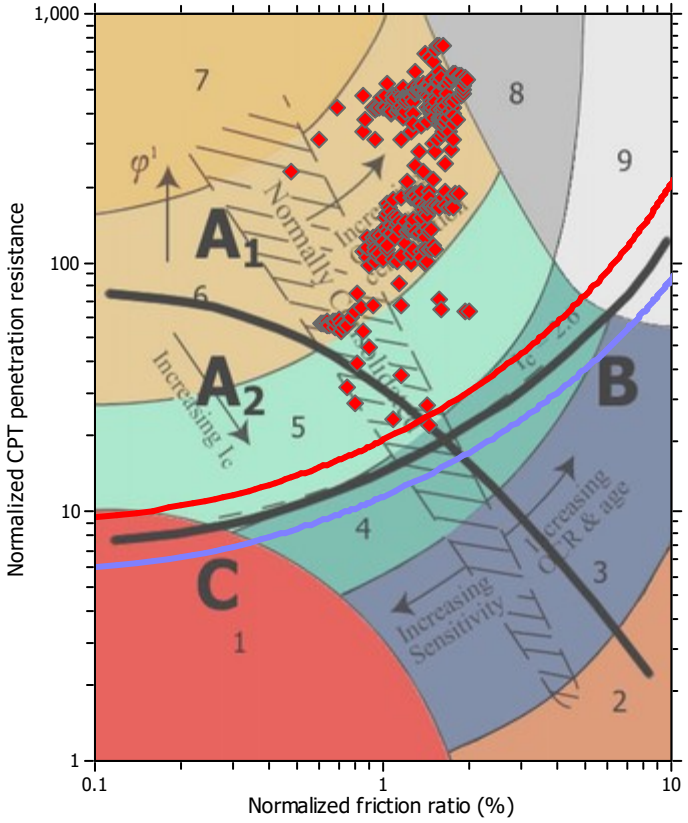
F.S. color scheme

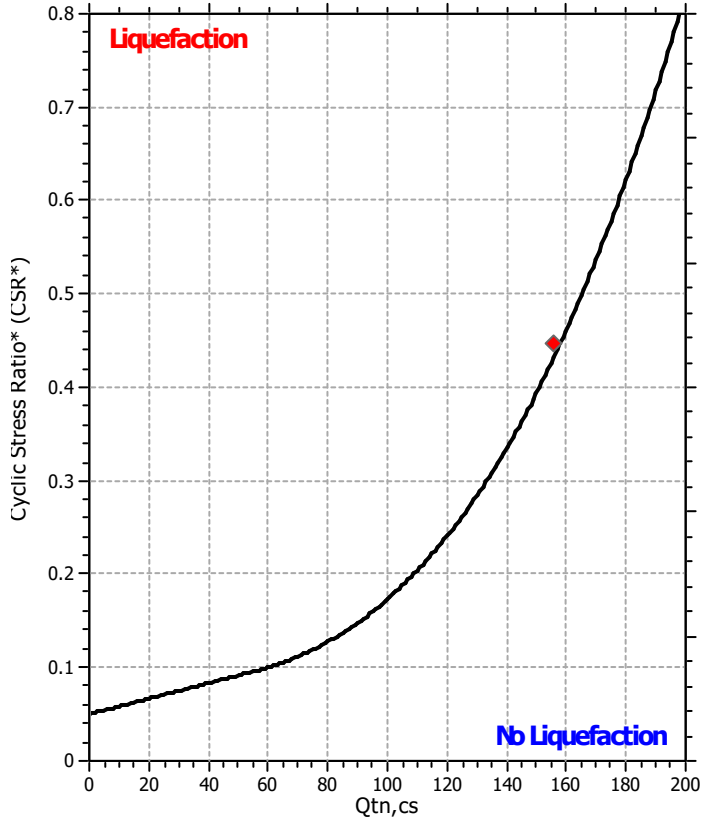
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

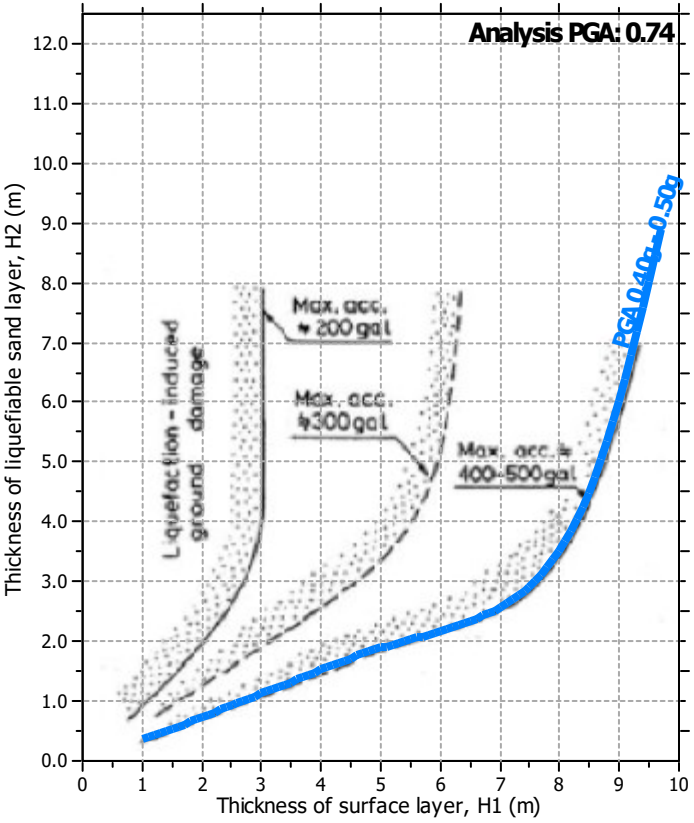
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



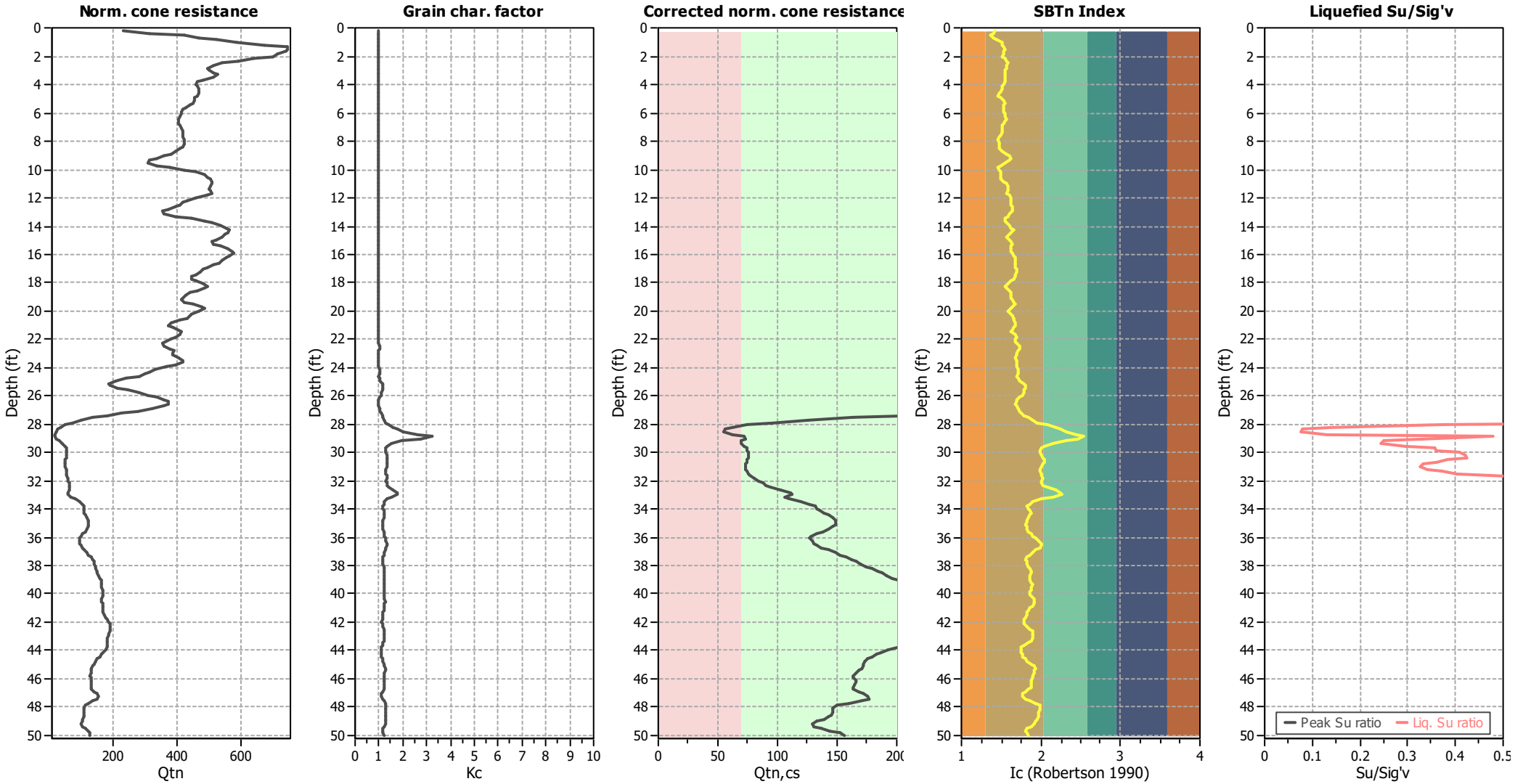




Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.44	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.74	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.44	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.74	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

EARTH SYSTEMS
1514 Moffett Street, Suite A | Salinas, CA 93905 | (831) 240-4624 | www.earthsystems.com

December 1, 2025 File No.: 306389-001

Mr. Andrei Petrutiu
Monterey County Public Works, Facilities, and Parks
1441 Schilling Place, South 2nd Floor
Salinas, CA 93901

PROJECT: NEW EAST GARRISON COUNTY BRANCH LIBRARY FEASIBILITY
13993 SHERMAN BOULEVARD
MARINA, CALIFORNIA

SUBJECT: Geotechnical Engineering Report Addendum

REF.: Geotechnical Engineering Investigation and Geologic Hazards Evaluation, New East Garrison County Branch Library Feasibility, 13993 Sherman Boulevard East Garrison, California, by Earth Systems Pacific, dated January 29, 2024

Dear Mr. Petrutiu:

At your request, Earth Systems has prepared this addendum to provide additional foundation recommendations to supplement the referenced geotechnical engineering investigation. Based on the grading plans and structural plans prepared by Kimley-Horn and Exforma Design, respectively, the proposed library is designed to be supported on a strip/spread footing foundation with a slab-on-grade throughout the interior of the library. The building will be graded such that an extended stem wall is shown to be up to 4 feet in height from the exterior finished grade to the interior finished grade along the eastern and southeastern perimeter of the library. As a result, the stem walls retaining more than 2 feet of soil need to be designed to retain the soil backfilled behind the stem wall to establish the interior slab-on-grade and proposed finished floor elevation. This addendum report provides retaining design parameters that should be utilized in the design of the stem walls.

Retaining Walls

Any stem wall retaining more than two (2) feet of soil should have the stem wall and footing foundation designed with a level backfill with lateral pressures taken as 60 pcf equivalent fluid weight under an at-rest condition. Any surcharges applied to the retaining walls should be taken as a uniform load on the wall using a factor of one-half the applied load.

Resistance to lateral loads should be calculated based on a passive equivalent fluid pressure of 300 pcf and a friction factor of 0.35. Passive and frictional resistance can be combined in the calculations, with the first 1 foot of soil embedment from the lowest adjacent soil pad grade being ignored before utilizing passive resistance unless the area adjacent to the footings is covered with concrete or asphalt concrete pavement. These values are based on the assumption that backfill adjacent to foundations is compacted to the grading specifications discussed in the referenced report above. Any backfill placed behind the stem walls should be placed in relatively uniform lifts not exceeding an inclination of 4:1 (horizontal: vertical).

We appreciate the opportunity to have provided services for this project and look forward to working with you again in the future. Please do not hesitate to contact our office if there are any questions concerning this report.

Sincerely,

Earth Systems Pacific

Tyler Brown, CE 92495
Project Engineer

Michelle Garcia, CEG
Senior Engineering Geologist

EARTH SYSTEMS
1514 Moffett Street, Suite A | Salinas, CA 93905 | (831) 240-4624 | www.earthsystems.com

January 13, 2025 File No.: 306389-002

Mr. Andrei Petrutiu
Monterey County Public Works, Facilities, and Parks
1441 Schilling Place, South 2nd Floor
Salinas, CA 93901

PROJECT: NEW EAST GARRISON COUNTY BRANCH LIBRARY
13993 SHERMAN BOULEVARD
EAST GARRISON, CALIFORNIA

SUBJECT: Grading and Structural Plan Review

REF.: Geotechnical Engineering Report Addendum, New East Garrison County Branch Library Feasibility, 13993 Sherman Boulevard East Garrison, California, by Earth Systems Pacific, dated January 29, 2024
Geotechnical Engineering Investigation and Geologic Hazards Evaluation, New East Garrison County Branch Library Feasibility, 13993 Sherman Boulevard East Garrison, California, by Earth Systems Pacific, dated January 29, 2024

Dear Mr. Petrutiu:

As requested, Earth Systems Pacific has completed a review of the grading and structural plans for the proposed library to be located at 13993 Sherman Boulevard, in Marina, California. The purpose of this review was to verify that the plans had been prepared in conformance with the recommendations of the referenced geotechnical engineering report and addendum report by Earth Systems.

The grading plans were prepared by Kimley-Horn and were last revised on November 21, 2025. The structural plans were prepared by Exforma Design and were last revised on December 23, 2025. The pertinent sheets reviewed included:

- Sheet C0.01 – Civil Engineering General Notes
- Sheet C2.00 – Horizontal Control and Paving Plan
- Sheet C3.00 – Grading and Drainage Plan
- Sheet C4.00 – Utility Plan
- Sheet C5.00 – Construction Details
- Sheet C5.01 – Construction Details
- Sheet S1.0 – General Notes
- Sheet S2.0 – Foundation Plan
- Sheet S3.2 – Details

Based on the review, it is our opinion that the above-listed plans for the proposed library are in substantial compliance with the geotechnical engineering recommendations presented in the referenced geotechnical report Earth Systems.

We trust this letter provides the information requested at this time. If you have any questions or need any additional information, please contact our office.

Sincerely,

Earth Systems Pacific

Tyler Brown, PE C92495
Project Engineer

Michelle Garcia, CEG
Senior Engineering Geologist