

**MONTEREY COUNTY WATER RESOURCES AGENCY**  
**AGREEMENT FOR PROFESSIONAL SERVICES**  
**WITH SURVEYORS, ARCHITECTS, ENGINEERS AND/OR DESIGN PROFESSIONALS**

This is a multi-year agreement between the Monterey County Water Resources Agency, hereinafter called "Agency," and Towill, Inc., a California Corporation, 2300 Clayton Rd, Suite 1200, Concord, CA 94520, hereinafter called "CONTRACTOR".

In consideration of the mutual covenants and conditions set forth in this Agreement, the parties agree as follows:

1. Employment of CONTRACTOR. Agency hereby engages CONTRACTOR and CONTRACTOR hereby agrees to perform the services set forth in Exhibit A, in conformity with the terms of this Agreement. CONTRACTOR will complete all work in accordance with the **Scope of Work/Work Schedule set forth in Exhibit A:**

- (a) The scope of work is briefly described and outlined as follows:  
Provide survey mapping services for the Interlake Tunnel and San Antonio Reservoir Spillway Modification projects
- (b) The CONTRACTOR shall perform its services under this agreement in accordance with usual and customary care and with generally accepted practices in effect at the time the services are rendered. The CONTRACTOR and its agents and employees performing work hereunder are specially trained, experienced, competent, and appropriately licensed to perform the work and deliver the services required by this Agreement.
- (c) CONTRACTOR, its agents and employees shall perform all work in a safe and skillful manner and in compliance with all applicable laws and regulations. All work performed under this Agreement that is required by law to be performed or supervised by licensed personnel shall be performed in accordance with such licensing requirements.
- (d) CONTRACTOR shall furnish, at its own expense, all materials and equipment necessary to carry out the terms of this Agreement, except as otherwise provided herein. CONTRACTOR shall not use Agency premises, property (including equipment, instruments, or supplies) or personnel for any purpose other than in the performance of its obligations hereunder.

2. Term of Agreement. The term of this Agreement shall begin upon execution of this Agreement by CONTRACTOR and Agency, and will terminate on June 30, 2017 unless earlier terminated as provided herein.

3. Payments to CONTRACTOR; maximum liability. Subject to the limitations set forth herein, Agency shall pay to CONTRACTOR the amounts provided in Exhibit B. The maximum amount payable to CONTRACTOR under this contract is one hundred twenty thousand one hundred thirteen dollars (\$ 120,113).

#### 4. Monthly Invoices by CONTRACTOR; Payment.

- (a) CONTRACTOR shall submit to Agency an invoice, in a format approved by Agency, setting forth the amounts claimed by CONTRACTOR, together with an itemized basis for such amounts, and setting forth such other pertinent information Agency may require. CONTRACTOR shall submit such invoice monthly or as agreed by Agency, but in no event shall such invoice be submitted later than 30 days after completion of CONTRACTOR's work hereunder. Agency shall certify the claim if it complies with this contract and shall promptly submit such claim to the Monterey County Auditor-Controller, who shall pay the certified amount within 30 days after receiving the invoice certified by Agency. It is understood and agreed that CONTRACTOR shall complete all work described in Exhibit A for an amount not exceeding that set forth above, notwithstanding CONTRACTOR's submission of periodic invoices.
- (b) CONTRACTOR agrees that Agency may withhold ten percent (10%) of the amount requested by CONTRACTOR from any progress payment, until such time as all goods and services are received in a manner and form acceptable to Agency.
- (c) If, as of the date of execution of this Agreement, CONTRACTOR has already received payment from Agency for work which is the subject of this Agreement, such amounts shall be deemed to have been paid under this Agreement and shall be counted toward Agency's maximum liability set forth above.
- (d) CONTRACTOR shall not be reimbursed for travel expenses unless expressly stated in this Agreement.

#### 5. Indemnification

5.1 For purposes of the following indemnification provisions ("Indemnification Agreement"), "design professional" has the same meaning as set forth in California Civil Code section 2782.8. If any term, provision or application of this Indemnification Agreement is found to be invalid, in violation of public policy or unenforceable to any extent, such finding shall not invalidate any other term or provision of this Indemnification Agreement and such other terms and provisions shall continue in full force and effect. If there is any conflict between the terms, provisions or application of this Indemnification Agreement and the provisions of California Civil Code Sections 2782 or 2782.8, the broadest indemnity protection for the COUNTY under this Indemnity Agreement that is permitted by law shall be provided by CONTRACTOR.

##### 5.2 Indemnification for Design Professional Services Claims:

CONTRACTOR shall indemnify, defend and hold harmless COUNTY, its governing board, directors, officers, employees, and agents against any claims that arise out of, or pertain to, or relate to the negligence, recklessness, or willful misconduct of the CONTRACTOR, its employees, subCONTRACTORS, and agents in the performance of design professional services under this Agreement, excepting only liability arising from the sole negligence, active negligence or willful misconduct of the COUNTY, or defect in a design furnished by the COUNTY.

### 5.3 Indemnification for All Other Claims or Loss:

For any claim, loss, injury, damage, expense or liability other than claims arising out of the CONTRACTOR's performance of design professional services under this Agreement, CONTRACTOR shall indemnify, defend and hold harmless COUNTY, its governing board, directors, officers, employees, and agents against any claim for loss, injury, damage, expense or liability resulting from or alleging injury to or death of any person or loss of use of or damage to property, arising from or related to the performance of services under this Agreement by CONTRACTOR, its employees, subCONTRACTORS or agents, excepting only liability arising from the sole negligence, active negligence or willful misconduct of the COUNTY, or defect in a design furnished by the COUNTY.

## 6. Insurance.

### 6.1 Evidence of Coverage:

Prior to commencement of this Agreement, the CONTRACTOR shall provide a "Certificate of Insurance" certifying that coverage as required herein has been obtained. Individual endorsements executed by the insurance carrier shall accompany the certificate. In addition the CONTRACTOR upon request shall provide a certified copy of the policy or policies.

This verification of coverage shall be sent to the Agency's Contact, unless otherwise directed. The CONTRACTOR shall not receive a "Notice to Proceed" with the work under this Agreement until it has obtained all insurance required and such, insurance has been approved by the Agency. This approval of insurance shall neither relieve nor decrease the liability of the CONTRACTOR.

### 6.2 Qualifying Insurers:

All coverage's, except surety, shall be issued by companies which hold a current policy holder's alphabetic and financial size category rating of not less than A- VII, according to the current Best's Key Rating Guide or a company of equal financial stability that is approved by the County's Purchasing Manager.

### 6.3 Insurance Coverage Requirements: Without limiting CONTRACTOR's duty to indemnify, CONTRACTOR shall maintain in effect throughout the term of this Agreement a policy or policies of insurance with the following minimum limits of liability:

Commercial general liability insurance, including but not limited to premises and operations, including coverage for Bodily Injury and Property Damage, Personal Injury, Contractual Liability, Broad form Property Damage, Independent CONTRACTORS, Products and Completed Operations, with a combined single limit for Bodily Injury and Property Damage of not less than \$1,000,000 per occurrence.

Modification (Justification attached; subject to approval).

Business automobile liability insurance, covering all motor vehicles, including owned, leased, non-owned, and hired vehicles, used in providing services under this Agreement, with a combined single limit for Bodily Injury and Property Damage of not less than \$1,000,000 per occurrence.

Modification (Justification attached; subject to approval).

Workers' Compensation Insurance, if CONTRACTOR employs others in the performance of this Agreement, in accordance with California Labor Code section 3700 and with Employer's Liability limits not less than \$1,000,000 each person, \$1,000,000 each accident and \$1,000,000 each disease.

Modification (Justification attached; subject to approval).

Professional liability insurance, if required for the professional services being provided, (e.g., those persons authorized by a license to engage in a business or profession regulated by the California Business and Professions Code), in the amount of not less than \$1,000,000 per claim and \$2,000,000 in the aggregate, to cover liability for malpractice or errors or omissions made in the course of rendering professional services. If professional liability insurance is written on a "claims-made" basis rather than an occurrence basis, the CONTRACTOR shall, upon the expiration or earlier termination of this Agreement, obtain extended reporting coverage ("tail coverage") with the same liability limits. Any such tail coverage shall continue for at least three years following the expiration or earlier termination of this Agreement.

Modification (Justification attached; subject to approval).

#### 6.4 Other Insurance Requirements.

All insurance required by this Agreement shall be with a company acceptable to the Agency and issued and executed by an admitted insurer authorized to transact Insurance business in the State of California. Unless otherwise specified by this Agreement, all such insurance shall be written on an occurrence basis, or, if the policy is not written on an occurrence basis, such policy with the coverage required herein shall continue in effect for a period of three years following the date CONTRACTOR completes its performance of services under this Agreement.

Each liability policy shall provide that the Agency shall be given notice in writing at least thirty days in advance of any endorsed reduction in coverage or limit, cancellation, or intended non-renewal thereof. Each policy shall provide coverage for CONTRACTOR and additional insureds with respect to claims arising from each subCONTRACTOR, if any, performing work under this Agreement, or be accompanied by a certificate of insurance from each subCONTRACTOR showing each subCONTRACTOR has identical insurance coverage to the above requirements.

*Commercial general liability and automobile liability policies shall provide an endorsement naming the County of Monterey, its officers, agents, and employees as Additional Insureds with respect to liability arising out of the CONTRACTOR'S work, including ongoing and completed operations, and shall further provide that such insurance is primary insurance to any insurance or self-insurance maintained by the County and that the insurance of the Additional Insureds shall not be called upon to contribute to a loss covered by the CONTRACTOR'S insurance. The required endorsement form for Commercial General Liability Additional Insured is ISO Form CG 20 10 11-85 or CG 20 10 10 01 in tandem with CG 20 37 10 01 (2000). The required endorsement form for Automobile Additional Insured endorsement is ISO Form CA 20 48 02 99.*

Prior to the execution of this Agreement by the Agency, CONTRACTOR shall file certificates of insurance with the Agency's contract administrator, showing that the CONTRACTOR has in effect the

insurance required by this Agreement. The CONTRACTOR shall file a new or amended certificate of insurance within five calendar days after any change is made in any insurance policy, which would alter the information on the certificate then on file. Acceptance or approval of insurance shall in no way modify or change the indemnification clause in this Agreement, which shall continue in full force and effect.

CONTRACTOR shall at all times during the term of this Agreement maintain in force the insurance coverage required under this Agreement and shall send, without demand by Agency, annual certificates to Agency's Contract Administrator. If the certificate is not received by the expiration date, Agency shall notify CONTRACTOR and CONTRACTOR shall have five calendar days to send in the certificate, evidencing no lapse in coverage during the interim. Failure by CONTRACTOR to maintain such insurance is a default of this Agreement, which entitles Agency, at its sole discretion, to terminate this Agreement immediately.

7. Maintenance of Records. CONTRACTOR shall prepare, maintain and preserve all reports and records that may be required by federal, State, and local rules and regulations relating to services performed under this Agreement. CONTRACTOR shall retain all such records for at least five years from the date of final payment, or until any litigation relating to this Agreement is concluded, whichever is later.

8. Right to Audit at Any Time. Agency officials shall have the right, at any time during regular working hours and on reasonable advance notice, to examine, monitor and audit all work performed and all records, documents, conditions, activities and procedures of CONTRACTOR or its subCONTRACTORS relating to this Agreement. Government Code Section 8546.7 provides that an audit by the State Auditor General may be performed up to three years after the final payment under any contract involving the expenditure of public funds in excess of \$10,000.

9. Confidentiality; Return of Records. CONTRACTOR and its officers, employees, agents, and subCONTRACTORS shall comply with all federal, State and local laws providing for the confidentiality of records and other information. To the extent permitted by applicable law and regulations, CONTRACTOR shall maintain confidentiality with respect to Agency's well database and other water use data. CONTRACTOR shall not disclose any confidential information received from Agency or prepared in connection with the performance of this Agreement without the express permission of Agency. CONTRACTOR shall promptly transmit to Agency all requests for disclosure of any such confidential information. CONTRACTOR shall not use any confidential information gained through the performance of this Agreement except for the purpose of carrying out CONTRACTOR's obligations hereunder. When this Agreement expires or terminates, CONTRACTOR shall return to Agency all records, which CONTRACTOR utilized or received, from Agency to perform services under this Agreement.

10. Termination. Either party may terminate this Agreement by giving written notice of termination to the other party at least thirty (30) days prior to the effective date of termination, which date shall be specified in any such notice. In the event of such termination, the amount payable hereunder shall be reduced in proportion to the services provided prior to the effective date of termination. Agency may terminate this Agreement at any time for good cause effective immediately upon written notice to CONTRACTOR. "Good cause" includes, without limitation, the failure of CONTRACTOR to perform the required services at the time and in the manner provided herein. If Agency terminates this Agreement for good cause, Agency may be relieved of the payment

of any consideration to CONTRACTOR, and Agency may proceed with the work in any manner, which it deems proper. Costs incurred by Agency thereby shall be deducted from any sum due CONTRACTOR.

11. Amendments and Modifications. No modification or amendment of this agreement shall be valid unless it is set forth in writing and executed by the parties.

12. Non-discrimination. Throughout the performance of this Agreement, CONTRACTOR will not unlawfully discriminate against any person because of race, color, religion, gender, national origin, ancestry, physical disability, medical condition, marital status, age older than 40, or sexual preference, gender identity or any other status protected under federal, state or local law, either in CONTRACTOR's employment practices or in the furnishing of services to recipients. CONTRACTOR shall ensure that the evaluation and treatment of its employees and applicants for employment and all persons receiving and requesting services are free of such discrimination. CONTRACTOR shall comply fully with all federal, State and local laws and regulations which prohibit discrimination. The provision of services primarily or exclusively to any target population designated herein shall not be deemed prohibited discrimination.

13. Independent CONTRACTOR. In its performance under this Agreement, CONTRACTOR is at all times acting and performing as an independent CONTRACTOR and not an employee of Agency. No offer or obligation of employment with Agency is intended in any manner, and CONTRACTOR shall not become entitled by virtue of this Agreement to receive from Agency any form of benefits accorded to employees including without limitation leave time, health insurance, workers compensation coverage, disability benefits, and retirement contributions. CONTRACTOR shall be solely liable for and obligated to pay directly all applicable taxes, including without limitation federal and State income taxes and social security arising out of CONTRACTOR's performance of this Agreement. In connection therewith, CONTRACTOR shall defend, indemnify, and hold harmless Agency from any and all liability, which Agency may incur because of CONTRACTOR's failure to make such payments.

14. Delegation of Duties; Subcontracting. CONTRACTOR is engaged by Agency for its unique qualifications and abilities. CONTRACTOR may not, therefore, delegate any of its basic duties under this Agreement, except to the extent that delegation to CONTRACTOR's employees is contemplated herein. No work shall be subcontracted without the written consent of Agency, except as provided in this Agreement or its attachments. Notwithstanding any subcontract, CONTRACTOR shall continue to be liable to Agency for the performance of all work hereunder. CONTRACTOR shall not assign, sell, mortgage or otherwise transfer its interest or obligations in this Agreement without Agency's prior written consent.

15. Agency's Rights in Work Product. All original materials prepared by CONTRACTOR in connection with its work hereunder -- including but not limited to computer codes, customized computer routines developed using proprietary or commercial software packages, reports, documents, maps, graphs, charts, photographs and photographic negatives -- shall be the property of Agency and shall be delivered to Agency prior to final payment. CONTRACTOR may utilize any existing materials developed by CONTRACTOR prior to commencement of work under this Agreement, which materials shall remain the property of CONTRACTOR.

16. Compliance with Terms of Federal or State Grant. If any part of this Agreement has been or will be funded pursuant to a grant from the federal or State government in which Agency is the grantee, CONTRACTOR shall comply with all provisions of such grant applicable to CONTRACTOR's work hereunder, and said provisions shall be deemed a part of this Agreement as though fully set forth herein.

17. Conflict of Interest. CONTRACTOR warrants that it presently has no interest and shall not acquire any interest during the term of this Agreement, which would directly or indirectly conflict in any manner or to any degree with its full and complete performance of all services under this Agreement.

18. Governing Laws. This Agreement is entered into in the County of Monterey, State of California, and shall be construed and enforced in accordance with the laws of the State of California. The parties hereby agree that the County of Monterey shall be the proper venue for any dispute arising hereunder.

19. Compliance with Applicable Law. The parties shall comply with all applicable federal, state, and local laws and regulations in performing this Agreement.

20. Construction of Agreement. The parties agree that each party has fully participated in the review and revision of this Agreement and that any rule of construction to the effect that ambiguities are to be resolved against the drafting party shall not apply in the interpretation of this Agreement or any exhibit or amendment. To that end, it is understood and agreed that this Agreement has been arrived at through negotiation, and that neither party is to be deemed the party which prepared this Agreement within the meaning of Civil Code Section 1654. Section and paragraph headings appearing herein are for convenience only and shall not be used to interpret the terms of this Agreement.

21. Waiver. Any waiver of any term or condition hereof must be in writing. No such waiver shall be construed as a waiver of any other term or condition herein.

22. Successors and Assigns. This Agreement and all rights, privileges, duties and obligations hereunder, to the extent assignable or delegable, shall be binding upon and inure to the benefit of the parties and their respective successors, permitted assigns and heirs.

23. CONTRACTOR. The term "CONTRACTOR" as used in this Agreement includes CONTRACTOR's officers, agents, and employees acting on Contactor's behalf in the performance of this Agreement.

24. Interpretation of Conflicting Provisions. In the event of any conflict or inconsistency between the provisions of this Agreement and the Provisions of any exhibit or other attachment to this Agreement, the provisions of this Agreement shall prevail and control.

25. Time is of the Essence. The parties mutually acknowledge and agree that time is of the essence with respect to every provision hereof in which time is an element. No extension of time for performance of any obligation or act shall be deemed an extension of time for performance of any other obligation or act, nor shall any such extension create a precedent for any further or future extension.

26. Contract Administrators. CONTRACTOR's designated principal responsible for administering CONTRACTOR's work under this Agreement shall be Brian Young; Agency's designated administrator of this Agreement shall be Germán Criollo.

27. Notices. Notices required under this Agreement shall be delivered personally or by electronic facsimile, or by first class or certified mail with postage prepaid. Notice shall be deemed effective upon personal delivery or facsimile transmission, or on the third day after deposit with the U.S. Postal Service. CONTRACTOR shall give Agency prompt notice of any change of address. Unless otherwise changed according to these notice provisions, notices shall be addressed as follows:

| TO AGENCY                                       | TO CONTRACTOR   |
|---|---|
| Name: Germán Criollo                            | Name: Brian Young   |
| Address: 893 Blanco Circle<br>Salinas, CA 93901 | Address: 2300 Clayton Road, Suite 1200<br>Concord, CA 94520 |
| Telephone: (831) 755-4860                       | Telephone: (925) 682-6976 ext 1041                          |
| Fax: (831) 424-7935                             | Fax: (925) 682-6390   |
| E-Mail: criollog@co.monterey.ca.us              | E-Mail: brian.young@towill.com                              |

28. Electronic Deliverables. Where feasible, all reports, documents and other printed information provided to the Agency pursuant to this Agreement shall be submitted in both written and Electronic formats in accordance with the specifications listed in Exhibit C.

29. Non-exclusive Agreement. This Agreement is non-exclusive and both parties reserve the right to contract with other entities for the same or similar services.

30. Execution of Agreement. Any individual executing this Agreement on behalf of an entity represents and warrants that he or she has the requisite authority to enter into this Agreement on behalf of such entity and to bind the entity to the terms and conditions hereof. This Agreement may be executed in two or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same agreement.

31. Exhibits. The following Exhibits are attached hereto and incorporated by reference:

- Exhibit A – Scope of Work / Work Schedule
- Exhibit B – Fee Schedule

32. Entire Agreement --As of the effective date of this Agreement, this document, including all exhibits hereto, constitutes the entire agreement between the parties, and supersedes any and all prior written or oral negotiations and representations between the parties concerning all matters relating to the subject of this Agreement.

**MONTEREY COUNTY WATER RESOURCES AGENCY**  
**AGREEMENT FOR PROFESSIONAL SERVICES**  
**WITH SURVEYORS, ARCHITECTS, ENGINEERS AND/OR DESIGN PROFESSIONALS**

IN WITNESS WHEREOF, Agency and CONTRACTOR execute this agreement as follows:

**MONTEREY COUNTY WATER  
RESOURCES AGENCY**

**CONTRACTOR**

BY:

BY:

\_\_\_\_\_  
David E. Chardavoyne  
General Manager

\_\_\_\_\_  
Type Name: \_\_\_\_\_  
Title: \_\_\_\_\_

Date:

Date:

\_\_\_\_\_

\_\_\_\_\_

BY:

\_\_\_\_\_  
Type Name: \_\_\_\_\_  
Title: \_\_\_\_\_

Date:

\_\_\_\_\_

**MONTEREY COUNTY WATER RESOURCES AGENCY**  
**AGREEMENT FOR PROFESSIONAL SERVICES**  
**WITH SURVEYORS, ARCHITECTS, ENGINEERS AND/OR DESIGN PROFESSIONALS**

\* INSTRUCTIONS: If CONTRACTOR is a corporation (including limited liability and nonprofit corporations), the full legal name of the corporation shall be set forth together with the signatures of two specified officers. If CONTRACTOR is a partnership, the name of the partnership shall be set forth together with the signature of a partner with authority to execute this Agreement on behalf of the partnership. If CONTRACTOR is contracting in an individual capacity, the individual shall set forth the name of his or her business, if any, and shall personally sign the Agreement.

( \_\_\_\_\_ )  
**Agreement/Amendment No #** ( \_\_\_\_\_ )

\* \* \* \* \*

Approved as to form:

Approved as to fiscal provisions:

\_\_\_\_\_  
Deputy County Counsel

\_\_\_\_\_  
Administrative Analyst

Dated: \_\_\_\_\_

Dated: \_\_\_\_\_

\_\_\_\_\_  
Risk Management:

\_\_\_\_\_  
Auditor-Controller:

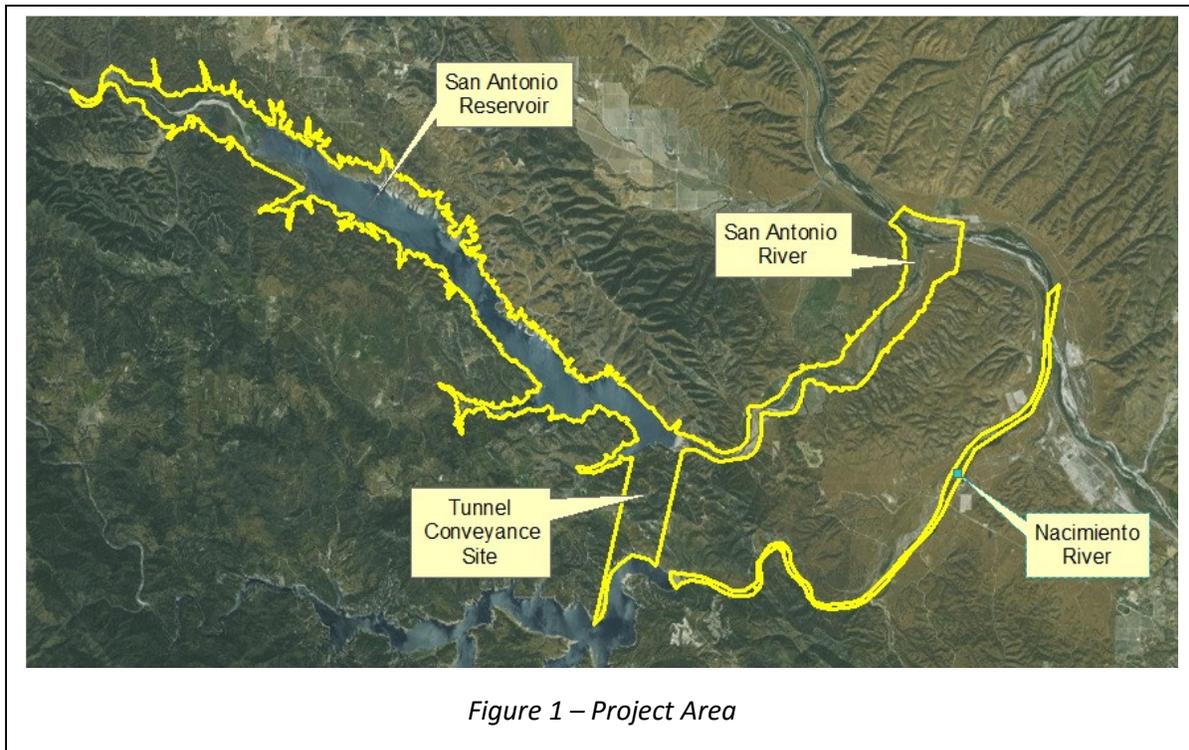
Dated: \_\_\_\_\_

Dated: \_\_\_\_\_

## Exhibit A- Scope of Work

### Overview

This Scope of Work provides survey and mapping services necessary to develop topographic mapping which will support environmental clearance and engineering studies for the Interlake Tunnel and Spillway Modifications Project underway by MCWRA. The project area is comprised of the tunnel conveyance site, the rim of San Antonio Reservoir, the San Antonio River between the San Antonio Dam and the confluence of the Salinas River, and the Nacimiento River from the Nacimiento Dam to the confluence of the Salinas River (see Figure 1).



### Task 1 - Work Plan Documentation

A Work Plan will be developed and presented to MCWRA for their review and approval prior to any field work being initiated. The Work Plan will finalize project parameters as follows:

- Develop KMZ files and corresponding PDF exhibits defining the precise project limits
- Identify which survey monuments will be used to relate the new topographic mapping to NGVD29 elevations and determine whether NAVD88 or NGVD29 will be used for the new mapping
- Develop a formal airborne LiDAR acquisition flight mission plan
- Develop a formal geodetic field survey plan including primary survey control points, aerial panel survey points, ground truth check points, and semi-permanent monuments within the tunnel conveyance site intended for future engineering design activities

- Determine appropriate raster DEM cell size (1ft to 5ft)
- Provide samples (from similar projects) of each final deliverable product

## **Task 2 - Ground Control Survey**

A ground control survey will be conducted to establish reliable ties to national horizontal and vertical datums. The horizontal control will be based on the North American Datum of 1983 (2011). The California Coordinate System Zone 4 will be used for the projection. This network will be accessed via the published coordinates of local Continuously Operating Reference Stations (CORS), Plate Boundary Observatory Stations (PBOS), and local GPS base station operated by the Consultant. NAVD88 will be used as the vertical datum for all GPS data processing however; the final topographic map deliverables may be delivered in NGVD29 elevations if specified by MCWRA.

### **Task 2 Deliverables**

1. Ground Survey Report summarizing the methods and procedures used to conduct the survey (PDF format)
2. List of NAD83 coordinates and NAVD88 elevations (NGVD29 where available) for each survey point (XLS format)
3. Survey monument record sheet (one page) including a photo for each semi-permanent monument established within the tunnel conveyance site (PDF format)

## **Task 3 – LiDAR Data Acquisition**

An airborne LiDAR data acquisition mission will be conducted encompassing the project area. LiDAR point density will average 10 points per square meter and up to four multiple returns are expected in vegetated areas.

Geodetic ground control for the LiDAR data acquisition mission is to be provided by operating airborne GPS (AGPS) during the flights and recording precise coordinates and elevations of each LiDAR point returned. Simultaneously an inertial measuring unit (IMU) is to capture the orientation of the aircraft for precise location laser pulse returns.

GPS base station observations will be conducted using National Geodetic Service (NGS) approved dual frequency GPS receivers. A minimum of two GPS receivers with fixed-height tripods are to be used as ground base stations running at a one (1.0) second epoch collection rates. Base station locations will not exceed 25 miles from the project area.

Following completion of the airborne data acquisition mission, the LiDAR point cloud data will be precisely calibrated, checked against the survey control and ground truth points, and written in LAS format files.

### **Task 3 Deliverables**

1. ArcGIS shapefile defining the LAS filename, date of collection, and limits of each LiDAR flight line (SHP format)
2. One set calibrated LiDAR point cloud data (LAS format)

#### **Task 4 - Bare Earth Classified LiDAR Data**

The calibrated LiDAR points are to be tiled into smaller size files and classified using a combination of automated and manual processes separating ground from non-ground points. An automated classification algorithm is to be used to identify the following classes:

Class 1 – Unassigned

Class 2 – Ground

Class 3 – Low Vegetation

Class 4 – Medium Vegetation

Class 5 – High Vegetation

Class 6 - Building

Class 7 – Noise

Class 8 – Model Key point

The LiDAR point data set classified through automation will be reviewed by technical staff focusing solely on ground vs. non-ground points. Points erroneously defined as ground will be set to Class 1. Similarly, LiDAR points hitting the ground but assigned through automation to another class are to be reassigned to Class 2 (ground).

#### **Task 4 Deliverables**

1. ArcGIS shapefile defining the tile indexing scheme for the LAS files (SHP format)
2. One set classified (1-8) LiDAR point cloud data files (LAS format)
3. LiDAR ground truth variance report (PDF format)

#### **Task 5 – LiDAR Digital Elevation Models (DEM) and 1ft Contours**

The bare-earth LiDAR data points (Class 2) will be used to generate a set of DEM files using ArcGIS software. The DEM files will be a 32-bit raster file in TIF or IMG format. The raster cell size may range from 1ft to 5ft as determined by MCWRA.

The bare-earth LiDAR data points will be “key-pointed” to thin the data-set while preserving the important details for the terrain surface. The key-points are to be used to develop a triangulated irregular network (TIN) surface.

Topographic contours will be generated from the TIN surfaces. Contour lines are to be developed at a vertical interval of 1-foot and in accordance with the NMAS guidelines for topographic maps.

Ninety percent (90%) of the elevations determined from the contours shall have an accuracy with respect to true elevation of one-half (1/2) of the contour interval or better, and the remaining ten-percent (10%) shall not be in error of more than one (1) contour interval.

For the CAD files, every fifth contour line will be labeled as an index contour and is distinguished using a heavier line style to enhance identification. Index contours will be attributed with their elevation in full feet.

#### **Task 5 Deliverables**

1. One set 32-bit raster DEM files (TIF or IMG format)
2. One set TIN surfaces in AutoCAD 3D Civil (DWG format)
3. One set AutoCAD files with 1ft contours and index contour annotation labels (DWG format)
4. 1ft topographic contours for use with ArcGIS (SHP format)

#### **Task 6 – Color Orthophoto Generation**

Color imagery (RGB) is to be acquired simultaneously with the LiDAR mission flights using a digital camera. The imagery is to be aero-triangulated and used to generate digital orthophotos with a six-inch pixel resolution at a scale of 1"=100'. The orthophotography is to cover the full extent of the project area.

#### **Task 6 Deliverables**

1. One set full-frame color imagery (JPG format)
2. One set color digital orthophotos tiled (GeoTIF format)
3. One MrSID orthophoto mosaic of the study area (SID format)
4. ArcGIS shapefile defining the tile indexing scheme for the orthophotos (SHP format)
5. ArcGIS shapefile defining the photo center for each full-frame image (SHP format)

#### **Task 7 – Planimetric Mapping**

Planimetric features are to be compiled using the aerial imagery and/or LiDAR dataset. Features to be compiled will be consistent with typical mapping practices for a map scale of 1"=100'. These will include buildings, paved and well-defined edge of roadways, driveways, major trails, rivers and other bodies of water.

1. Planimetric features for use with AutoCAD (DWG format)
2. Planimetric features for use with ArcGIS (SHP format)

### Exhibit B- Fee Schedule

Costs for the project will be fixed price and based on milestone submittals as detailed below:

| <b>Task</b>             | <b>Description</b>                            | <b>Cost</b>       |
|-------------------------|---|-------------------|
| 1                       | Work Plan                                     | \$ 1,600          |
| 2                       | Ground Control Survey                         | \$ 37,400         |
| 3                       | LiDAR Data Acquisition                        | \$ 30,800         |
| 4                       | Bare Earth Classified LiDAR Data              | \$ 17,500         |
| 5                       | Development of LiDAR DEM Model & 1ft Contours | \$ 7,200          |
| 6                       | Digital Orthophotos                           | \$ 19,013         |
| 7                       | Planimetric Map                               | \$ 6,600          |
| <b>Total Fixed Cost</b> |   | <b>\$ 120,113</b> |