REQUEST FOR PROPOSALS

for

Structural Engineering Design Services

Dekoven Tanks Replacement

Project 15-89

CIP: 08-1621-CP



MANDATORY PRE-PROPOSAL MEETING: July 17, 2018 AT 11 AM

RESPONSES DUE: August 7, 2018 AT 3 PM

Mid-Peninsula Water District 3 Dairy Lane Belmont, CA 94002

1.0 INTRODUCTION

The Mid-Peninsula Water District (District) invites proposals from qualified Consultants to provide structural engineering design services for two new welded steel potable water storage tanks.

District Background

The Mid-Peninsula Water District, formerly Belmont County Water District, was formed in 1929 from the physical plant of seven independent systems, including the Spring Valley Water Company, which were united and began functioning as a public utility in 1930. Since the first operation, the District has purchased its entire water supply from the City of San Francisco Water Department. The District now supplies water to consumers in an area slightly larger than the city limits of the City of Belmont. Small portions of the service area are within the City Limits of the City of San Carlos, Redwood City, and parts of the unincorporated County of San Mateo. The District's service territory covers approximately five square miles and serves approximately 28,000 people. In the event of an emergency the District can serve or be served with inter-ties between neighboring utilities, as of today the District has one inter-tie with Foster City, three with San Carlos, one with Redwood City and three with San Mateo.

Dekoven Tanks Replacement Project

Located on a parcel along Dekoven Avenue approximately 300 feet south of Lincoln Avenue in Belmont, CA, the Dekoven Tanks are a critical element of the District's Zone 3 distribution system. The two existing water storage tanks, constructed in 1952, are 52-feet and 60-feet in diameter with nominal capacities of 0.72 and 1.0 million gallons (MG), respectively. Both tanks are approximately 48-feet tall. A structural review of the tanks was completed in 2016 and indicated that the tanks are seismically vulnerable (Attachment A - Dekoven Tanks Structural Review Report). The District considered various alternatives and determined replacement of the tanks was the best option.

The 2016-2017 Comprehensive Capital Improvement Program (CIP), adopted by the District Board of Directors on May 26, 2016, includes CIP Project No. 15-89 - Dekoven Tanks Replacement for replacement of the two existing tanks with two new 0.8 MG tanks to improve seismic reliability (see Attachment B - CIP Project Summary).

For more information on the District, please visit the District's website at <u>www.midpeninsulawater.org</u>



Figure 1. Project Location

1.1 <u>Structural Engineering Design Services</u>

Pakpour Consulting Group (PCG) serves as MPWD District Engineer and will lead the Dekoven Tanks Replacement design. The selected consultant will contract directly with the District and will provide the structural engineering design services for the design of the two new welded steel water storage tanks, foundations, and associated structural elements. PCG will manage the consultant and be responsible for the balance of the project design, including demolition of existing facilities, site civil design and civil infrastructure. The structural engineering design will be incorporated into the PCG design to produce a single set of biddable construction documents.

2.0 SCHEDULE OF EVENTS

The following schedule is tentative and subject to change at District's discretion:

Event	<u>Date</u>
Request for Proposals Released	July 3, 2018
Mandatory Pre-Proposal Meeting	July 17, 2018 at 11:00 AM
Written Questions from Consultants Deadline	July 20, 2018 at 12:00 PM
Responses from District Posted on District's Webpage	July 27, 2018
Receipt of Proposal Deadline	August 7, 2018 at 3:00 PM
Announce Shortlist for Interviews (if necessary)	August 17, 2018
Conduct Interviews (if necessary)	August 21, 2018

Consultant Selected, Begin Contract Negotiations	August 30, 2018
Contract Negotiations Completed	September 7, 2018
Request for District Board of Directors Approval Deadline	September 20, 2018
District Board of Directors to Approve/Award Contracts	September 27, 2018
Notice to Proceed	October 1, 2018

Proposals received by **no later than 3:00 PM, Tuesday, August 7, 2018**, will be evaluated by a selection committee. Based on the selection committee's evaluations, the Mid-Peninsula Water District will negotiate a professional services agreement (PSA) with the selected firm.

3.0 SCOPE OF SERVICES

3.1 <u>Tank Replacement Structural Engineering Design Services</u>

Provide structural engineering design services including but not limited to the following:

- a) Preliminary Design Report
 - Attend project Kickoff Meeting
 - Review available documents, including record drawings, site layout drawings, and engineering reports.
 - Perform site evaluation and investigation.
 - Provide geotechnical services necessary for the required scope of services
 - Provide recommendations for tank construction methods, project phasing (if any), and tank footprint
 - Prepare 30% structural design plan with elevation view
 - Provide updated estimate of probable costs

Deliverables

- 1. Geotechnical Investigation 3 hard copies and PDF
- 2. Preliminary Design Report 3 hard copies and PDF
- b) *Construction Documents*
 - Prepare structural engineering designs, calculations, plans, specifications, cost estimate and contract bidding documents.
 - Submit structural plans and construction documents at the 60%, 90%, and final stages for District staff review.
 - Final drawings shall be wet signed, stamped, and dated by a Structural Engineer licensed in the State of California on 24-inch by 36-inch bond and 4-mil mylar.
 - Provide with final submittal, all project calculations, correspondence, photos, electronic files, and supporting/reference information.

- Provide all project AutoCAD files (i.e., drawings, x-refs, blocks, fonts, pen styles, etc.) on CD, DVD, or portable USB drive format.
- Prepare all drawings in standard engineering scale using AutoCAD in specified format/version.

Deliverables

- 1. 60% Design Plans, Specifications, and Cost Estimates
- 2. 90% Design Plans, Specifications, and Cost Estimates
- 3. Final Design Plans, Specifications, and Cost Estimates
- c) Bidding Stage Services
 - Assist the District in answering bidder's questions, issuing addendums, attend pre-bid conferences, and job walks.
- d) Construction Stage Services
 - Attend pre-construction meetings and other meetings as required.
 - Visit construction site as required for progress and quality of work evaluation.
 - Review contractor materials submittals, mix designs, tank calculations, and shop drawings.
 - Respond to contractor requests for information (RFIs) and provide clarification to plans.
 - Perform site visits as needed.

3.2 <u>Compensation</u>

The cost shall be formatted in a not to exceed cost estimate (number of person hours multiplied by the proposed billing rates of the Consultant) for each scope of services item to be performed.

3.3 <u>Ownership of Documents</u>

Title to all final documents, including but not limited to drawings, specifications, data, reports, summaries, correspondences, photographs, computer software (if purchased on the District's behalf), video and audio recordings, software output, and any other materials with respect to work performed shall be provided to District upon completion of the work. Any information obtained by the Consultant as a result of performing the services shall become the property of the District and shall not be released to others without prior written consent from the District.

4.0 **PROPOSAL REQUIREMENTS**

The proposal submission shall not exceed twenty-five (25) single-sided standard sized (8½" x 11") pages. Minimum font size of 11 required. The page limit does not apply to any folder, cover letter, one-page table of contents, or sample plans (appendix). Each page must be numbered. Costs for preparing and submitting a response to this Request for Proposals (RFP) are entirely the responsibility of the Consultant.

The proposal shall include the following:

Cover Letter

Summary - Provide a brief summary of the firm's proposal contents, emphasizing qualifications and capabilities of the Consultant and any subconsultants, if appropriate. The summary should indicate an understanding of structural engineering services required for performance.

Project Team Information - The Consultant shall identify the legal name and address of company, the legal form of company (partnership, corporation, joint venture, etc.; if joint venture, identify the members of the joint venture and provide all information required within this section for each member), and the address(es) of office(s) working on the project.

Conflict of Interest Disclosure - The Consultant shall disclose and list any financial, business, or other relationships with the District that may have an impact on the outcome of the project required for performance. A potential conflict of interest includes, but is not limited to, work related to contracts with other District departments, other municipalities, local land developers, current clients, and other parties who may have a financial interest in the outcome of the project. See the Conflict of Interest section on the attached standard Professional Services Agreement (Attachment C) for more information. At the District's discretion, a potential conflict of interest may be waived or factored into final award decisions and/or a modified scope of services.

RFP Exceptions - The Consultant shall list any exceptions to this RFP including, but not limited to, the District's standard Professional Services Agreement (Attachment C).

Signature and Contact Information - The cover letter shall be signed by the Consultant's Project Manager and an official authorized to negotiate and contractually bind the firm with the District regarding the requested services. The Project Manager shall be the main contact with the District for technical and contractual issues and shall be responsible for the direction of day-to-day progress. Please provide the telephone number, e-mail address, and office location of the Project Manager.

Section 1 – Approach

State what makes your firm uniquely qualified for our District and for providing structural engineering design services for the Dekoven Tanks Replacement Project (Attachment B). What sets you apart? Why should we retain your firm over other firms?

Describe your approach to the work and identify key requirements and constraints. Demonstrate knowledge and clear understanding of the scope of work, responsiveness to RFP, and capability of performing specific tasks outlined in this RFP.

Section 2 - Team Qualifications and Experience

Provide an organizational chart of the project management team, including any subconsultants. Include resumes of key personnel (including Consultant's Project Manager) proposed for the contract. The proposed Project Manager and key team members should remain the same through the course of the project. Any changes in proposed staffing will require the written approval of the District. The minimum qualifications for a Project Manager

are as follows:

- Registered Civil Engineer or Structural Engineer in California in good standing
- Experience successfully completing, in a similar role, at least two (2) projects of similar nature, complexity, and size during the last five (5) years.
- Knowledge of water tank structural engineering design and construction standards, requirements, and procedures.

Section 3 - Related Project Experience

Provide sample water storage tank structural design projects that the proposed project team has worked on together. At a minimum, information should also contain scope of services, completion date, costs (project construction cost, consultant fee, and cost of non-owner initiated change orders), and agency contact information. Projects that are similar to the Dekoven Tanks Replacement Project preferred, including projects located on constrained sites where one or more tanks were required to remain in service during construction. Provide sample plans (11x17) as an appendix to the proposal.

Provide at a minimum three (3) references for water storage tank structural design projects that the project team has performed or is performing. List assignments completed, including description of work performed, completion date, costs (project construction cost, consultant fee, and cost of non-owner initiated change orders), and agency contact information.

Section 4 – Scope of Work, Project Schedule, and Cost Proposal

Provide a detailed description of services that your firm anticipates to be performed for this project and addresses all known project objectives. Provide a project schedule that identifies major tasks and milestones. Provide a proposed compensation rate schedule for services (including proposed subconsultants)

<u>Appendix</u>

Provide the following documents (do not count toward 25-page limit):

• Sample plans (11x17) of water storage tank structural design project(s)

5.0 SELECTION PROCESS

5.1 <u>Proposal Evaluation</u>

Proposals are to be reviewed by an evaluation committee using the following rating matrix to determine the ranking of proposals:

Section 1 - Approach	30 points
Section 2 - Team Qualifications and Experience	20 Points
Section 3 - Related Project Experience and References	30 Points

Section 4 – Scope of Work, Project Schedule, and Cost Proposal 20 Points

The evaluation committee will rank the firms and determine if interviews are necessary and/or recommend which firm will be selected.

5.2 <u>Consultant Selection</u>

All firms are hereby notified that the selection of the Consultant for this contract and any agreements for services resulting from the Request for Proposals is dependent on the approval by the District Board of Directors.

5.3 <u>Protest Procedures and Dispute Resolution</u>

The protest procedures and dispute resolution process shall be conducted in accordance with Mid-Peninsula Water District policies.

6.0 SUBMITTAL OF PROPOSAL

6.1 <u>Submittal</u>

Please submit five (5) paper copies and one (1) electronic copy (PDF format provided on a USB flash drive) of your proposal **no later than 3:00 PM, Tuesday August 7, 2018,** to:

Mr. Rene Ramirez, Operations Manager Mid-Peninsula Water District 3 Dairy Lane Belmont, CA 94002

Proposals are to be submitted in sealed packages with the following information clearly marked on the outside of each package:

- Name of Consultant
- Project Title: "Structural Engineering Design Services Dekoven Tanks Replacement Proposal"
- Package Number (e.g., 1 of ____, 2 of ____)

Proposals submitted by email and/or facsimile are not acceptable and will not be considered.

Proposals received by the due date will be ranked by a selection committee. Late submittals will not be accepted. The District assumes no liability for delays caused by delivery service. Postmarking by the due date will not substitute for actual receipt.

6.2 Mandatory Pre-Proposal Meeting

A pre-proposal meeting will be held at **11 AM, Tuesday, July 17, 2018**, at the Mid-Peninsula Water District (3 Dairy Lane, Belmont, CA 94002). At this meeting the District will discuss the project, scope of services, and professional services agreement and respond to questions from the attendees.

The Pre-Proposal Meeting is mandatory for all prime consultants and highly recommended for all subconsultants. Proposals received from prime consultants that did not attend the meeting (based on the official attendance list) will not be accepted.

6.3 <u>Questions</u>

Please submit any questions regarding this RFP, insurance requirements, and professional services agreement in writing to rramirez@midpeninsulawater.org no later than 12:00 p.m., Friday, July 20, 2018. Answers to all questions will be posted on the District's website by Friday, July 27, 2018. Please note that questions will only be accepted via e-mail and responses will be compiled and posted on the District's webpage. It is the responsibility of the consultant to obtain any Questions & Answers (Q&A) issued by the District. The District is not responsible for any holder of the RFP or consultant not obtaining a copy of Q&A's issued by the District.

6.4 <u>Proposal Information</u>

The District reserves the right to reject any and all proposals submitted.

All responses to the RFP become the property of the District.

All costs incurred during proposal preparation or in any way associated with the Consultant's preparations, submission, presentation, or interview, if held, shall be the sole responsibility of the Consultant.

The District reserves the sole right to evaluate each proposal and to accept or reject any or all proposals received as a result of the RFP process.

The District reserves the unqualified right to modify, suspend, or terminate at its sole discretion any and all aspects of the RFP and/or RFP process, to obtain further information from any and all consultant teams and to waive any defects as to form or content of the RFP or any responses by any consultant teams.

Once a final selection is made, all RFP responses, except financial and proprietary information, become a matter of public record and shall be regarded by the District as public records. The District shall not in any way be liable or responsible for the disclosure of any such records or portions thereof if the disclosure is made pursuant to a request under the Public Records Act.

7.0 DISTRICT'S RESPONSIBILITY

The District will provide the following information to the selected consultant as needed:

- Archive drawings and reports related to existing District facilities.
- District's standard specifications and design guide.
- Answering non-technical questions during bid period.
- Reviewing all Consultant's deliverables and providing comments in a timely manner.

8.0 ATTACHMENTS

Attachment A - Dekoven Tanks Structural Review Report

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Attachment B - CIP Project Summary

Attachment C - Sample District Professional Services Agreement

Attachment A

Dekoven Tanks Structural Review Report



Dekoven Water Tanks

Mid-Peninsula Water District Belmont, CA

Structural Review and Retrofit Strategy Report

March 21, 2016



Structural Engineering • Construction Services • Engineering Solutions • Project Management

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March 21, 2016 2015049

Pakpour Consulting Group, Inc. 5776 Stoneridge Mall Road, Suite 320 Pleasanton, CA 94588

Attention: Joubin Pakpour

Subject: Dekoven Water Tanks Structural Review and Retrofit Strategy Report

Dear Joubin:

Cornerstone Structural Engineering Group is pleased to present this summary of our structural review and retrofit strategy report. In accordance with our proposal, we have performed a general structural conditional and seismic assessment of the Dekoven water tanks. This report contains an evaluation for the existing 720,000 & 1,000,000 gallon steel water tanks located on the Dekoven Tank site in Belmont. Originally built in 1952, Dekoven East Tank is 48 feet tall by 52 feet in diameter and Dekoven West Tank is 48 feet tall by 60 feet in diameter

The structural provisions of the current California Building Code refer to the ASCE 7-10 for determination of design loads for structures designed within California. The ASCE 7-10 in turn refers to AWWA D100-11 for analysis and design of welded steel water storage tanks. This report uses those criteria to evaluate the seismic performance of the existing steel water tanks. In addition, a general conditional assessment of the water tanks is also included.

We conducted an initial site visit on June 05, 2014 with subsequent site visits on November 04, 2015 and December 03, 2015. Although no construction drawings of the Dekoven Tanks were available, a previous evaluation and inspection report was also reviewed as part of our investigation. Part of our report compares our evaluation and conclusions with that previous report.

The following report describes the findings of our conditional review and seismic risk assessment to evaluate the performance of the steel water tanks when subjected to a code-level earthquake. Recommendations to address conditional issues and remediate seismic deficiencies are described in the conclusions.

Please feel free to give me a call if you have any additional questions.

Sincerely, CORNERSTONE STRUCTURAL ENGINEERING GROUP, INC Thomas L. Swayze, S.E. Principal

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PART 1: INTRODUCTION

The following represents a general structural conditional and seismic assessment of the existing Dekoven East and West tanks located on Dekoven Avenue in Belmont, California. Both tanks are owned and maintained by the Mid-Peninsula Water District.



Figure 1: Dekoven Tanks Site Area Photo (Source: Google Maps)

Built in 1952, the Dekoven East and West tanks are unanchored, welded carbon-steel water storage tanks with nominal capacities of 0.72 and 1.0 million-gallons respectively. Both tanks are approximately 48 feet in height with an approximately 52 foot diameter for Dekoven East and a 60 foot diameter for Dekoven West. The tanks each have a base elevation of approximately 588 feet and provide service to Mid-Peninsula Water District in Belmont.

An initial site visit was performed on June 5, 2014 to observe the existing exterior structural conditions of both tanks. Since both tanks were in operation at the time of the initial visit, we were unable to observe the tank interior. Cornerstone made subsequent site visits on November 4, 2015 and December 3, 2015. During the November 4th site visit, the roof hatch was opened on Dekoven East in order to visually observe the tank interior roof framing system. Dekoven West was subsequently taken out of service for the winter at which point the tank interior and roof structure was observed during the December 3rd site visit.

The report conclusions are limited by the availability of as-built construction documents and by the level of access possible for the observation of the tank. This report describes the findings of our structural review, and provides recommendations for seismic upgrade and conditional structural repairs as applicable. See part 3 for further discussion regarding observation access and as-built documentation.





Figure 2: Dekoven Tanks Site Photo (Source: Google Maps)

PART 2: SEISMIC PERFORMANCE EVALUATION

2.1 Methodology

The potential damage to a structure in an earthquake can be evaluated provided that, (1) seismic hazards which affect the structure and site can be estimated and, (2) the vulnerability of the structure to those hazards are known or can be estimated.

Seismic evaluation of the existing welded carbon-steel water tank was conducted using:

- American Water Works Association (AWWA) D100-11 Welded Carbon Steel Tanks for Water Storage
- American Society of Civil Engineers (ASCE) 7-10 Minimum Design Loads for Buildings and Other Structures
- Site specific S_s, S₁, S_{Ms} and S_{M1} seismic ground motion parameter values approximated by the USGS Seismic Hazard Curves program based off the 2008 NEHRP Maps.

Seismic evaluation of the Dekoven East and West steel water tanks were performed using seismic design forces calculated in accordance with the AWWA D100-11 standard for new welded steel water tank construction.

AWWA D100-11 adopts the ACSE 7 methodology for the determination of lateral loads used for seismic design of water tanks and is based on a Maximum Considered Earthquake (MCE) ground motions, defined as the motions caused by a seismic event with a 2 percent probability of exceedance within a 50 year period which is commonly referred to as a 2,475-year earthquake. Design ground motions are then derived by scaling MCE ground motion values by a factor of 2/3 which is the design basis for standard structures. Design ground motions correlate to a seismic event with a 10



percent probability of exceedance within a 50 year period and are referred to as a 475year earthquake. Water tanks considered to be essential are designed with an importance factor increase of 1.5 applied to the design ground motions. See below for further discussions.

The methodology used in our assessment uses an importance factor of 1.5 as described in the following section, for Seismic Use Group III as documented in the AWWA D100-11 based approach. This Seismic Use Group is for essential facilities and is equivalent to an occupancy/risk category IV under the 2013 CBC and ASCE 7-10.

2.2 Seismic Use Group

AWWA D100-11 seismic design identifies three Seismic Use Groups I, II & III and assigns an importance factor, I_E to each group. I_E is a multiplier that is applied to lateral load forces relative to their importance to the community to ensure that a structure will sustain less damage in an earthquake. Public water tanks which provide service considered to be essential for post-earthquake recovery, including fire suppression, are designated as seismic use group III and are assigned an importance factor, I_E of 1.5 which is the most stringent criteria. As a result, an essential service water tank will be designed to withstand 50% more lateral load than a non-essential tank.

Dekoven East and West tanks were evaluated for an importance factor, I_E of 1.5.

2.3 Seismic Source

The seismicity in the Bay Area is influenced by several known faults, their potential faulting length, and relative orientation. The San Andreas Fault system, which separates the North American plate from the Pacific plate, is located approximately 2 miles to the west of the Dekoven East and West tank site. The known, nearest-site faults with recorded activity are listed in Table 1, as follows:

Controlling Fault	Estimated MCE (Mw)	Distance to Site (miles)
San Andreas Fault	7.8	2.0
Hayward Fault	7.0	13.7
Calaveras Fault	6.8	22.4

Table 1: Active Near Source Faults

Based on the California Geologic Survey (CGS) and the United States Geologic System (USGS) mapping, the 475-year peak ground acceleration (PGA) for the Dekoven Tanks site is 0.585g.

Recent earthquakes in Southern and Central California – namely Coalinga, Whittier Narrows, and Northridge – have occurred along blind-thrust faults. These faults do not have readily identifiable surface features and are not extensively mapped. The potential for strong-ground motion to occur due to blind-thrust faulting in Northern California is somewhat in doubt. However, a moderate to large earthquake centered even closer to the site cannot be completely ruled out.

It should be noted that a more thorough explanation of site seismicity and specific faulting hazards could be provided by a geotechnical engineer. The conclusions above rely on general published data for the San Francisco Bay Area.



PART 3: WATER TANK EVALUATION

3.1 Documentation

Design or fabrication drawings for the Dekoven tanks were not available for evaluation. A Seismic Vulnerability Assessment was performed by G&E Engineering Systems and published on January 23, 2003. This report documents general information for each of the ten tanks in the distribution system including overflow elevation, bottom elevation, capacity, year built, and style. This report identifies the Dekoven Tanks as being unanchored welded steel tanks with a flat roof and resting on a sand/asphalt type foundation. Lastly, this report also documents potential hazards to seismic uplift of the tanks including damage to inlet pipes and a cell phone tower antenna attached to the tanks.

A report titled "Earthquake Analysis of Water Storage Tanks" was published in July, 1980 by John Rinne in which potential hazards due to seismic activity were investigated. The diameter, height, shell thickness, and capacity are tabulated in that document for each tank in the distribution system. According to Rinne, the shell thicknesses have been "calculated in accordance with the AWWA Standard but have not been confirmed at this time". Field testing was performed on both tanks to verify the tank plate and shell thicknesses. Results for the testing are summarized below in Section 3.3.

Finally, a Daily Inspection Report was issued by DB Gaya Consulting on April 24, 2013 to assess the condition of the interior and exterior coatings of the Dekoven East tank. Within this report, all corrosion, blisters, and fractures on the interior and exterior of the tank are documented.

3.2 Evaluation

Seismic evaluation of the steel water tank was performed using the AWWA D100-11 standard.

- Dekoven East and West tanks are considered essential to maintain water service in the event of an earthquake therefore it was evaluated using an importance factor, I_E of 1.5 (essential service).
- In lieu of no site specific soil classification or seismic parameters, a site classification C was assumed for the Dekoven Tank site for very dense soil and soft rock per the USGS Soil Type and Shaking Hazard in the San Francisco Bay Area Map. Seismic ground motion parameter values approximated by the USGS Seismic Hazard Curves program for site class C are listed in Table 2 as follows:

Ss	2.162g
S ₁	1.029g
Sds	1.441g
S _{D1}	0.892g

Table 2: Seismic Ground Motion Parameters

- Dekoven East and West tanks are not anchored to a foundation and were initially evaluated as 'self-anchored' tanks to determine seismic vulnerabilities and deficiencies. The AWWA D100-11 response modification factors R_i and R_c used to determine the impulsive and convective design accelerations are 2.5 and 1.5 respectively.
- Dekoven East and West tanks were then evaluated as mechanically anchored tanks to determine potential retrofit options. The response modification factors $R_{\rm i}$



and $R_{\rm c}$ used to determine the impulsive and convective design accelerations are 3.0 and 1.5 respectively.

3.3 Construction

The Dekoven East and West water tanks are flat bottom welded carbon-steel tanks, 48 feet in height by 52 and 60 feet in diameter respectively. The tanks are founded on sand/asphalt base without a concrete ring wall foundation.

• The tank shell of Dekoven East is constructed of eight courses of plates for a total height of 48 feet. Construction of the tank shell appears to be continuous butt welds at both the longitudinal and circumferential plate joints. The tank shell of Dekoven West is constructed of six courses of plates for a total height of 48 feet. In our analysis, it was assumed that the shell material is ASTM A283, Gr. A. This assumption was based on recommendations by Paso Robles Tank for steel water tanks built during this time frame. Ultrasonic testing of the existing tank plate thicknesses has been performed by CSI Services, Inc. to verify various plate thicknesses of each tank. The results of this testing were documented in a report dated December 29, 2015 and are summarized below. These tabulated values are averages based on readings at each location.

Location	Inches
Roof Plate	0.186
Shell Course No. 8	0.235
Shell Course No. 7	0.243
Shell Course No.6	0.235
Shell Course No. 5	0.282
Shell Course No. 4	0.358
Shell Course No. 3	0.405
Shell Course No. 2	0.468
Shell Course No. 1	0.66
Floor Plate	0.221

Table 3: Measured Tank Plate Thicknesses for Dekoven East

Location	Inches
Roof Plate	0.206
Shell Course No. 6	0.234
Shell Course No. 5	0.242
Shell Course No. 4	0.286
Shell Course No. 3	0.398
Shell Course No. 2	0.487
Shell Course No. 1	0.616
Floor Plate	0.215

Table 4: Measured Tank Plate Thicknesses for Dekoven West



- Measurements of exterior rafters on Dekoven East were taken at the exterior shell of the tank from the roof hatch, however not all framing could be verified. The roof framing of Dekoven East tank consists of radial C12x rafters which span approximately 26 feet from a central double C10x column outward to the outer shell of the tank. Intermediate C8x rafters span from the outer shell of the tank to an intermediate ring of assumed C6x girders, located approximately two-thirds away from the exterior shell.
- Measurements of exterior rafters on Dekoven West were taken at the exterior shell of the tank from the roof hatch, however not all framing could be verified. The roof framing of Dekoven West tank consists of radial C6x rafters which span approximately 30 feet from a central double C10x column outward to the outer shell of the tank. Intermediate C6x rafters span from the outer shell to an intermediate pentagon of assumed C10x girders, located approximately 15 feet from the exterior shell. The main rafters are also supported be these girders. Intermediate transverse braces are located approximately 5 feet from the tank shell.
- The tank bottom plate was observed to extend approximately 3 inches beyond the exterior of the tank shell. The base of the shell is connected to the bottom plate with continuous interior and exterior fillet welds.
- It appears the tank is serviced by a 12-inch diameter inlet/outlet pipe connected by a flexible pipe segment.
- It appears there is a 12-inch diameter exterior overflow pipe that exits the tank through the tank shell approximately 1 foot below the tank roof and has a clear drop into a drainage pipe.
- There is one approximately 30-inch diameter man-way door.
- There is an exterior roof access ladder, as well as an interior ladder that is serviced by a square roof access hatch.
- There is a large central roof vent on each tank and four mitered vents equally spaced around the perimeter of the Dekoven East tank roof.
- There is a concrete curb that wraps around the perimeter of each tank and is approximately 6 inches from the exterior of the tank shell.
- There is an approximately 6-inch thick reinforced concrete retaining wall around the perimeter of each tank approximately 4 feet from the exterior of the tank shell. This retaining wall varies in height and a portion of the wall appears to have been added onto the top of original wall. (See Photo 6)
- There are cell phone towers supported on assumed drilled piers directly adjacent to each of the tanks and located between the exterior tank shell and the concrete retaining perimeter wall.

The Dekoven tank site also has a pump house that appears to be a reinforced masonry building with a flexible wood roof diaphragm and an approximately 3 foot tall parapet. A conditional and cursory ASCE 41-13 Tier 1 seismic evaluation for Life Safety was conducted on the building to determine any potential seismic deficiencies. As-builts were not available for the evaluation of the pump house.

3.4 Condition

Both tanks were in operation during our initial site visits so that only the exterior and roof of the tank could be observed. During our December 3rd site visit, the interior of Dekoven



West tank was observed once the tank was taken out of service for winter maintenance. Roof framing members were visually observed, however precise measurements could not be taken. The interior of the tank was inspected and documented in the Daily Inspection Report issued by DB Gaya Consulting on April 24, 2013. Based on this report as well as our field visits, the existing tank appears to be in general compliance with the codes and standard construction practices in effect at the time of its construction. The existing conditions observed by DB Gaya Consulting that were confirmed during our site visits are as follows:

- The ceiling is showing signs of corrosion around all of the roof plate edges and some corrosion starting in the middle of various plates.
- Roof vents are showing advanced signs of corrosion. They will require a closer inspection to assess their condition.

Additional existing conditions observed during our site visits are as follows:

- The top flange of the ceiling rafters below the roof plate are showing signs of corrosion as well as along the edges of the roof plates, Photo 3.
- There are some localized gaps along the perimeter of the tank between the floor plate and the soil up to 2 inches, Photo 4.
- There are several cell phone towers with assumed drilled piers adjacent to the tanks that will interfere with a new ring wall foundation, Photo 5.
- There is an extension to the original retaining wall curb that surrounds the tank that was subsequently added on at a later date to raise the height of the curb. The construction of this additional wall is unknown and the connection between the two wall segments is of concern, Photo 6.
- According to the District, there is an approximately 1 foot deep vertical steel plate on the inside face of the tank perimeter concrete curb.

Based on our review, the pump house appears to be in general compliance with the codes and standard construction practices in effect at the time of its construction. Although the exterior and interior of the building was observed, roof access was not available during the site visit. Based on our observations, the building appears to be in good general condition.

3.5 Lateral Load System

Lateral loads for the steel tank structure result primarily from either wind pressure acting upon the exterior tank surface or earthquake induced inertia forces acting on the tank structure and its contents. The lateral-force resisting system consists solely of the cylindrical steel tank shell which transfers lateral loads to the base of the tank by a combination of circumferential tension and vertical tension/compression shell stresses. Tank overturning and sliding forces are partially resisted by the tank self-weight and a portion of its contents.

Evaluation of the existing tanks with no modifications was performed based on a maximum operating water level of 46 feet per the direction from the Mid-Peninsula Water District.

• Evaluation shows that the existing tanks have sufficient self-weight to resist seismic sliding forces for Dekoven East and Dekoven West respectively, however they do not have sufficient self-weight to resist seismic overturning forces with Demand to Capacity (D/C) ratios of 4.9 and 4.5 respectively for Dekoven Tank East and Dekoven Tank West.

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- Evaluation shows that Dekoven East tank has adequate shell thicknesses to resist hydrodynamic and hydrostatic circumferential hoop tension stresses with D/C ratio of 0.9, while Dekoven West analysis indicates that the hoop tension stresses at the bottom of course No. 4 are overstressed with a D/C ratio of 1.1.
- For both tanks, the value of the overturning ratio (J) is calculated as greater than 1.54, resulting in an unstable tank. Mechanical anchorage to a concrete footing will be required to mitigate this instability.
- Height between the soffit of the existing roof framing at its lowest point and the surface of water at maximum capacity is less than 2 feet. The calculated freeboard height to accommodate a code level earthquake wave sloshing is approximately 8.5 feet for Dekoven East tank and 9 feet for Dekoven West tank. Evaluation shows that wave sloshing due to earthquake forces is likely to cause damage to roof plate and/or roof framing during the design level earthquake considered.

Finding for the Pump House Building

Based on the ASCE 41 Tier 1 review, the following items are of significance for the performance of buildings when subjected to strong ground motions during an earthquake.

Positive Features

- Foundations show little to no signs of significant settlement or distress.
- Reinforced masonry walls are within allowable shear stress limits.

Negative Features and Unconfirmed Construction Details

- With no as-built drawings, the following items cannot be confirmed:
 - Fully grouted CMU walls: Based on similar buildings constructed in this era, the walls are most likely fully grouted.
 - Adequate roof-to-wall ties: Based on similar buildings constructed in this era, the roof-to-wall ties are either inadequate or missing entirely. Lack of positive wall anchor ties would rely only on cross grain bending of wood ledgers, which is an inefficient and code prohibited load mechanism.
 - Adequate shear transfer from the diaphragm into the shear walls as well as from the wall into the foundation
 - Reinforcing around wall openings
 - Roof construction: It is assumed that the roof diaphragm consists of an unblocked plywood sheathing over 2x roof joists. The construction can be verified by opening up the ceiling.

3.6 Expected Performance

Due to inadequate self-weight to resist earthquake overturning forces, lack of foundation and tank anchorage, and insufficient freeboard, the Dekoven East and West water tanks are anticipated to be severely damaged, with a potential loss of contents and damage to the roof framing during the design level earthquake.

The pump house is anticipated to perform average in comparison to buildings of similar construction when subjected to a design level earthquake due to the assumed inadequate roof-to-wall ties.

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PART 4: SUMMARY

Findings within this report provide a general structural conditional and seismic assessment of the Dekoven East and West water tanks located in Belmont, California. Dekoven East and West tanks are flat bottomed, welded steel water tanks constructed in 1952. The tanks are each 48 feet in height with Dekoven East being 52 feet in diameter with a nominal capacity of 0.72 million-gallons and Dekoven West being 60 feet in diameter with a nominal capacity of 1.0 million-gallons. The tanks each have a base elevation of approximately 588 feet and provide service to Mid-Peninsula Water District in Belmont. The tanks are founded upon a sand/asphalt base without a ring wall foundation or foundation anchors.

4.1 Findings

Based on our review, the Dekoven East and West water tanks appear to be in general compliance with the codes and standard construction practices in effect at the time of its construction in 1952.

Further, the Dekoven East and West water tanks are not expected to resist a design level earthquake as determined by the AWWA D100-11 criteria for tanks considered necessary for essential services. The following specific deficiencies are noted:

- Inadequate freeboard height to accommodate earthquake wave sloshing is likely to result in damage to roof plate and or roof framing, tank shell at roof framing attachments, and the floor plate at shell to bottom weld and column connections.
- Lack of foundation and foundation anchors to resist earthquake uplift is likely to result in significant uplift of the tank shell. This will likely result in significant damage to the tank shell, floor plate, and piping connections.

As part of our evaluation we reviewed the previous evaluation of Dekoven East and West by John E. Rinne dated July, 1980. To a great extent, our conclusions (based on AWWA D100 criteria) agree with those presented by Rinne, except for the following issues, which do not have a significant effect on our conclusions:

 John Rinne calculated shell thicknesses in accordance with AWWA standards and assumed constant shell thickness throughout the height of the tank. These thicknesses were not confirmed in the field during the time of his evaluation. We have obtained actual shell thicknesses of each of the Dekoven tanks through the use of ultrasonic testing by CSI Services Inc. For both Dekoven tanks, the tested thicknesses were found to be thicker than those reported by Rinne towards the bottom of the tank and thinner than those reported by Rinne towards the top.

4.2 General Recommendation for Conditional Issues

The following recommendations are provided to address issues concerning the general conditions outlined in this report:

- Areas of localized rust and corrosion upon framing members should be cleaned and inspected during scheduled painting and maintenance. If more than 10% of the flange section is lost, then a repair detail should be developed.
- Questionable detailing issues in regard to the existing curb construction will likely be addressed as part of the proposed new ring wall foundation construction as shown in Detail C shown in Figure 5 in the Appendix.



• Geotechnical recommendations are necessary to evaluate curb repairs, as well as new foundations for seismic strengthening. A reinforced concrete ring wall foundation around the perimeter of each tank is recommended as part of this seismic evaluation.

4.3 Seismic Recommendations

The following recommendations are provided to address the seismic deficiency issues outlined in this report:

Freeboard

- Option 1: Increase the freeboard by lowering the overflow elevation so that the seismic wave will not interact with the roof framing.
 - If the Maximum Operating Level (MOL) is lowered from the current MOL of 46 feet by 7 feet down to 39 feet for Dekoven East and Dekoven West, the calculated freeboard will be greater than the sloshing wave height and thus an adequate freeboard height will be provided. This option requires no strengthening of roof framing for seismic wave sloshing, but diminishes the holding capacity of each tank significantly.
 - This option would require anchorage of each tank to a ring wall foundation to resist seismic overturning forces (see Detail C shown in figure 5 of the Appendix)
- Option 2: Increase the freeboard so that the roof rafters do not require strengthening.
 - If the Maximum Operating Level (MOL) at Dekoven East is lowered from the current MOL of 46 feet by 5 feet down to 41 feet, there will be 7 feet of freeboard height provided. At this water level, the calculated wave sloshing height is 8.5 feet. This would result in a hydrostatic upwards loading on the outer roof framing of approximately 1.5 feet. The existing roof rafters can adequately resist these forces, therefore no strengthening of the rafters is required. The roof plate can adequately resist these forces if the roof plate is welded to the roof rafters. This depth was selected for consideration because it is the highest the operating level can be without replacement or strengthening of the roof rafters. This option may require strengthening of the rafter to shell connections to be able to resist the roof rafter reaction caused from the sloshing wave.
 - o If the Maximum Operating Level (MOL) at Dekoven West is lowered from the current MOL of 46 feet by 5 feet down to 41 feet, there will be 7 feet of freeboard height provided. At this water level, the calculated wave sloshing height is 9.0 feet. This would result in a hydrostatic upwards loading on the outer roof framing of approximately 2.0 feet. The existing intermediate roof rafters will require strengthening of their bottom flanges in order to resist these forces. However, the main roof rafters can adequately resist these forces, therefore no strengthening of the main rafters is required. The roof plate can adequately resist these forces if the roof plate is welded to the roof rafters. This depth was selected for consideration because it is the highest the operating level can be without replacement or strengthening of the main roof rafters and roof plate. This option may require strengthening of the rafter to shell connections to be able to resist the roof rafter reaction caused from the sloshing wave.



- This option would require anchorage of each tank to a ring wall foundation to resist seismic overturning forces (see Detail C shown in figure 5 of the Appendix)
- Option 3: Increase the freeboard so that the existing roof can remain in place and retrofitted.
 - If the Maximum Operating Level (MOL) is lowered from the current MOL of 46 feet by 2 feet down to 44 feet for Dekoven East and from the current MOL of 46 feet by 4 feet down to 42 feet for Dekoven West, the calculated freeboards will be 4 feet and 6 feet respectively. This will require strengthening of the roof rafters to resist a hydrostatic upwards loading on the outer roof framing of 4.5 feet for Dekoven East and 3.0 feet for Dekoven West.
 - For Dekoven East, main roof rafters and intermediate roof rafters will require strengthening of bottom flanges by welding on steel plates and bracing the bottom flange with transverse bracing at 4 feet on center with C6x members (See Detail B shown in figure 4 of the Appendix). This option would also require strengthening of the rafter to shell connection to be able to resist the roof rafter reaction caused from the sloshing wave. The outer 12 feet of the roof plate would also require strengthening, which could be accomplished with supplemental framing at 4 feet on center and welding the roof plate to the rafters.
 - For Dekoven West, outer roof rafters and intermediate girders will require strengthening of bottom flanges by welding on steel plates and bracing of bottom flange with transverse bracing at 5 feet on center with C6x members (See Detail B shown in figure 4 of the Appendix). This option does not require strengthening of the existing roof plate itself; however the roof plate will be required to be welded to the roof rafters. The interior girder support ring would also require strengthening of the bottom flange as well as bracing of the bottom flange by providing diagonals to main rafters at every other rafter (See Detail A shown in figure 3 of the Appendix). This option would also require strengthening of the rafter to shell connection to be able to resist the roof rafter reaction caused from the sloshing wave.
 - This option would require anchorage of each tank to a ring wall foundation to resist seismic overturning forces (see Detail C shown in figure 5 of the Appendix)
- Option 4: Maintain current 46 ft water level elevation.
 - If Maximum Operating Level (MOL) is desired to remain at the current level without damage to roof, then all components of the roof structure will require replacement. This new roof structure may be an external rafter system to reduce maintenance costs as there would be less surface area and far easier to coat that surface area within the tanks where the conditions are more prone to corrosion for inaccessible and difficult to coat areas.



- Option 5: Increase the freeboard by lowering the overflow elevation so that the tank will not require anchorage to a ring wall foundation.
 - If the Maximum Operating Level (MOL) at Dekoven East is lowered from the current MOL of 46 feet by 24 feet down to 22 feet, the tank will have adequate self-weight to resist seismic sliding and overturning without being anchored to a ring wall footing. This would mean a drop in holding capacity of approximately 380,000 gallons.
 - If the Maximum Operating Level (MOL) at Dekoven West is lowered from the current MOL of 46 feet by 22 feet down to 24 feet, the tank will have adequate self-weight to resist seismic sliding and overturning without being anchored to a ring wall footing. This would mean a drop in holding capacity of approximately 465,000 gallons.

Foundation and Anchors

• Construct a new reinforced concrete ring wall foundation with anchorage to provide proper uplift resistance (See Details C & D shown in figures 5 and 6 of the Appendix). This option would require shoring of the existing tanks while the new foundation is constructed. In order to construct this foundation, the existing concrete curbs and retaining walls will need to be demolished and reconstructed as part of the new foundation. The assumed drilled piers supporting the cell phone towers will also need to be incorporated into the new ring wall foundation design.

The first four freeboard options discussed above will require a 4'-0" deep ring wall foundation ranging in size from 9'-0" wide to 11'-6" wide with anchor rod spacing varying from approximately 4.0' to 6.5'.

Pump House

- Provide new roof-to-wall ties. Access to the roof substrate will be required and it is recommended that the building be reroofed during this process.
- Perform a destructive testing program to determine if CMU walls are fully grouted.

4.4 Cost Estimate

Although Dekoven East and West have performed adequately for the past 63 years, we recommend that it be repaired to remedy existing conditional issues, as well as strengthened to increase its survivability in the event of a code level earthquake or replaced with a new tank. The following cost estimates were provided by Cornerstone and developed jointly with Paso Robles Tank, Inc and Pakpour Consulting Group. **Estimates for the retrofit options do not include finish coating of the interior and exterior of the tank**. These costs are for structural costs only and do not include planning or engineering.

Option 1

Pump House Strengthening		
Roof-to-Wall Ties & Reroofing	\$75,000	
20% contingency	\$15,000	
Pump House Strengthening Subtotal	\$90,000	



<u>Seismic Strengthening (Two Tanks)</u>	
East Tank Overflow Retrofit	\$20,000
West Tank Overflow Retrofit	\$20,000
New foundation and anchors	\$625,000
20% contingency	\$130,000
Seismic Strengthening Subtot	al \$795,000
Tota	al: \$885,000
Option 2	
Pump House Strengthening	
Roof-to-Wall Ties & Reroofing	\$75,000
20% Contingency	\$15,000
Pump House Strengthening Subtot	ai \$ 90,000
Solimic Strongthoning (Two Tonks)	
Seismic strengthening (Two Tanks)	A20.000
Strengthen ratter connections at shell East	st \$30,000
Strengthen rafter connections at shell We	est \$35,000
New foundation and anchors	\$670,000
20% contingency	\$150,000
Seismic Strengthening Subtot	al \$885,000
Tot	al. \$975.000
<u>Tota</u>	<u>al: \$975,000</u>
Option 3	<u>al: \$975,000</u>
<u>Tota</u> Option 3 <u>Pump House Strengthening</u>	<u>al: \$975,000</u>
<u>Tota</u> Option 3 <u>Pump House Strengthening</u> Roof-to-Wall Ties & Reroofing	al: \$975,000 \$75,000
<u>Tota</u> <u>Option 3</u> <u>Pump House Strengthening</u> Roof-to-Wall Ties & Reroofing <u>20% contingency</u>	al: \$975,000 \$75,000 \$15,000
<u>Tota</u> <u>Option 3</u> <u>Pump House Strengthening</u> Roof-to-Wall Ties & Reroofing <u>20% contingency</u> Pump House Strengthening Subtot	al: \$975,000 \$75,000 \$15,000 al \$90,000
<u>Tota</u> <u>Option 3</u> <u>Pump House Strengthening</u> Roof-to-Wall Ties & Reroofing <u>20% contingency</u> Pump House Strengthening Subtot	al: \$975,000 \$75,000 \$15,000 al \$90,000
<u>Tota</u> <u>Option 3</u> <u>Pump House Strengthening</u> Roof-to-Wall Ties & Reroofing <u>20% contingency</u> Pump House Strengthening Subtot <u>Seismic Strengthening (Two Tanks)</u>	al: \$975,000 \$75,000 \$15,000 al \$90,000
<u>Tota</u> <u>Option 3</u> <u>Pump House Strengthening</u> Roof-to-Wall Ties & Reroofing <u>20% contingency</u> Pump House Strengthening Subtot <u>Seismic Strengthening (Two Tanks)</u> Strengthen rafters and connections East	al: \$975,000 \$75,000 \$15,000 al \$90,000 \$250,000
<u>Tota</u> <u>Option 3</u> <u>Pump House Strengthening</u> Roof-to-Wall Ties & Reroofing <u>20% contingency</u> Pump House Strengthening Subtot <u>Seismic Strengthening (Two Tanks)</u> Strengthen rafters and connections East Strengthen rafter and connections West	al: \$975,000 \$75,000 \$15,000 al \$90,000 \$250,000 \$210,000
<u>Tota</u> <u>Option 3</u> <u>Pump House Strengthening</u> Roof-to-Wall Ties & Reroofing <u>20% contingency</u> Pump House Strengthening Subtot <u>Seismic Strengthening (Two Tanks)</u> Strengthen rafters and connections East Strengthen rafter and connections West New foundation and anchors	al: \$975,000 \$75,000 \$15,000 al \$90,000 \$250,000 \$210,000 \$710,000
<u>Deption 3</u> <u>Pump House Strengthening</u> Roof-to-Wall Ties & Reroofing <u>20% contingency</u> Pump House Strengthening Subtot <u>Seismic Strengthening (Two Tanks)</u> Strengthen rafters and connections East Strengthen rafter and connections West New foundation and anchors <u>20% contingency</u>	al: \$975,000 \$75,000 \$15,000 al \$90,000 \$250,000 \$250,000 \$210,000 \$210,000 \$710,000 \$230,000
<u>Tota</u> <u>Option 3</u> <u>Pump House Strengthening</u> Roof-to-Wall Ties & Reroofing <u>20% contingency</u> Pump House Strengthening Subtot <u>Seismic Strengthening (Two Tanks)</u> Strengthen rafter and connections East Strengthen rafter and connections West New foundation and anchors <u>20% contingency</u> Seismic Strengthening Subtot	al: \$975,000 \$75,000 \$15,000 al \$90,000 \$250,000 \$210,000 \$210,000 \$710,000 \$230,000 al \$1,400,000
<u>Dotion 3</u> <u>Pump House Strengthening</u> Roof-to-Wall Ties & Reroofing 20% contingency Pump House Strengthening Subtot <u>Seismic Strengthening (Two Tanks)</u> Strengthen rafters and connections East Strengthen rafter and connections West New foundation and anchors 20% contingency Seismic Strengthening Subtot	al: \$975,000 \$75,000 \$15,000 \$15,000 \$90,000 al \$90,000 \$250,000 \$210,000 \$210,000 \$210,000 \$230,000 \$230,000 al \$1,400,000
<u>Dotion 3</u> <u>Pump House Strengthening</u> Roof-to-Wall Ties & Reroofing 20% contingency Pump House Strengthening Subtot <u>Seismic Strengthening (Two Tanks)</u> Strengthen rafter and connections East Strengthen rafter and connections West New foundation and anchors 20% contingency Seismic Strengthening Subtot	al: \$975,000 \$75,000 \$15,000 \$15,000 \$15,000 al \$90,000 \$250,000 \$210,000 \$210,000 \$210,000 \$230,000 \$230,000 al \$1,400,000 al: \$1,490,000
<u>Iota</u> <u>Option 3</u> <u>Pump House Strengthening</u> Roof-to-Wall Ties & Reroofing <u>20% contingency</u> Pump House Strengthening Subtot <u>Seismic Strengthening (Two Tanks)</u> Strengthen rafter and connections East Strengthen rafter and connections West New foundation and anchors <u>20% contingency</u> Seismic Strengthening Subtot <u>Tota</u> <u>Option 4</u>	al: \$975,000 \$75,000 \$15,000 \$15,000 \$15,000 al \$90,000 \$250,000 \$210,000 \$210,000 \$210,000 \$230,000 \$230,000 al \$1,400,000 al: \$1,490,000
<u>Iota</u> <u>Option 3</u> <u>Pump House Strengthening</u> Roof-to-Wall Ties & Reroofing <u>20% contingency</u> Pump House Strengthening Subtot <u>Seismic Strengthening (Two Tanks)</u> Strengthen rafter and connections East Strengthen rafter and connections West New foundation and anchors <u>20% contingency</u> Seismic Strengthening Subtot <u>Tota</u> <u>Option 4</u> <u>Pump House Strengthening</u>	al: \$975,000 \$75,000 \$15,000 \$15,000 \$15,000 al \$90,000 \$250,000 \$210,000 \$210,000 \$210,000 \$230,000 \$230,000 al \$1,400,000 al: \$1,490,000
Introduct Option 3 Pump House Strengthening Roof-to-Wall Ties & Reroofing 20% contingency Pump House Strengthening Subtot Seismic Strengthening (Two Tanks) Strengthen rafters and connections East Strengthen rafter and connections West New foundation and anchors 20% contingency Seismic Strengthening Subtot Intervention Option 4 Pump House Strengthening Roof-to-Wall Ties & Reroofing	al: \$975,000 \$75,000 \$15,000 \$15,000 \$15,000 al \$90,000 \$250,000 \$210,000 \$210,000 \$210,000 \$230,000 \$230,000 al \$1,400,000 al: \$1,490,000 \$75,000 \$75,000
Introduct Option 3 Pump House Strengthening Roof-to-Wall Ties & Reroofing 20% contingency Pump House Strengthening Subtot Seismic Strengthening (Two Tanks) Strengthen rafters and connections East Strengthen rafter and connections West New foundation and anchors 20% contingency Seismic Strengthening Subtot Intervention Option 4 Pump House Strengthening Roof-to-Wall Ties & Reroofing 20% contingency	al: \$975,000 \$75,000 \$15,000 \$15,000 \$15,000 al \$90,000 \$250,000 \$210,000 \$210,000 \$210,000 \$230,000 \$230,000 al \$1,400,000 al: \$1,490,000 \$75,000 \$15,000





	Seismic Strengthening (Two Tanks)			
	Replace roof East		\$290,000	
	Replace roof West		\$350,000	
	New foundation and anchors 20% contingency		\$800,000 \$290,000	
	Seismic Strengthening Su	btotal	\$1,730,000	
		<u>Total:</u>	<u>\$1,820,000</u>	
<u>Optior</u>	<u>15</u>			
	Pump House Strengthening			
	Roof-to-Wall Ties & Reroofing		\$75,000	
	20% contingency		\$15,000	
	Pump House Strengthening Su	btotal	\$90,000	
	Seismic Strengthening (Two Tanks)			
	East Tank Overflow Retrofit		\$20,000	
	West Tank Overflow Retrofit		\$20,000	
	20% contingency		\$10,000	
	Seismic Strengthening Su	btotal	\$50,000	

<u>Total: \$140,000</u>

As a comparison to the retrofit options noted in this seismic evaluations, costs have also been provided for replacement of the existing tanks with new tanks, designed to the current AWWA standard. Costs for two options of replacement are noted below; one for replacing the existing (2) Dekoven tanks with (2) new tanks of similar size and one for replacing the existing (2) Dekoven tanks with (1) new tank with a similar holding capacity as the existing tanks. The following cost estimates were provided jointly by Paso Robles Tank, Inc and Pakpour Consulting Group. **Estimates for the replacement options include finish coating of the interior and exterior of the tank**. These costs are for structural costs only and do not include planning or engineering.

Two New 0.9 MG, 60'D x 53'H (42.5' MOL) Tanks

Pump House Strengthening	
Roof-to-Wall Ties & Reroofing	\$75,000
20% contingency	\$15,000
Pump House Strengthening Subtotal	\$90,000
Two New Tanks	
Remove existing tanks	\$125,000
Grading and excavation	\$210,000
New Tank (Erection and Paint)	\$1,500,000





Foundation and anchors	\$420,000 \$450,000
20% contingency	\$450,000
New Tanks Subtotal	\$2,700,000
<u>Total:</u>	<u>\$2,800,000</u>
<u>One New 1.8 MG, 85'D x 55'H (42' MOL) Tank</u>	
Pump House Strengthening	
Roof-to-Wall Ties & Reroofing	\$75,000
20% contingency	\$15,000
Pump House Strengthening Subtotal	\$90,000
<u>One New Tank</u>	
Remove existing tanks	\$125,000
Grading and excavation	\$210,000
New Tank (Erection and Paint)	\$1,250,000
Foundation and anchors	\$210,000
20% contingency	\$360,000
New Tanks Subtotal	\$2,160,000
<u>Total:</u>	<u>\$2,250,000</u>







PART 5: APPENDIX



Photo 1: Exterior of Dekoven West Tank



Photo 2: Minor Corrosion of Tank Roof









Photo 3: Minor Corrosion at Roof Rafters



Photo 4: Localized Gaps Below Tank Bottom









Photo 5: Cell Phone Towers on Drilled Pier Adjacent to the Tank



Photo 6: Retaining Wall Addition Adjacent to the Tank











Photo 7: Dekoven East Roof Framing



Photo 8: Dekoven West Roof Framing







Figure 1: Dekoven East Roof Strengthening Plan



OPTION 3



Figure 2: Dekoven West Roof Framing Plan



CORNERSTONE structural engineering group



Figure 3: Girder Bracing









Figure 4: Rafter Strengthening





Footing Schedule											
Dekoven East						Dekove	en West				
Option	W (ft)	L (ft)	T (ft)	D (ft)	# Anchors	Option	W (ft)	L (ft)	T (ft)	D (ft)	# Anchors
MOL = 46'	11.5	6.5	5.5	4.0	44	MOL = 46'	11.0	6.0	5.0	4.0	47
MOL = 44'	11.0	6.0	5.0	4.0	40	MOL = 42'	9.5	4.5	5.0	4.0	36
MOL = 41'	10.0	5.0	5.0	4.0	33	MOL = 41'	9.5	4.5	5.0	4.0	34
MOL = 39'	9.0	4.0	5.0	4.0	27	MOL = 39'	9.0	4.0	5.0	4.0	29



Figure 5: Foundation Ring Wall & Anchors





Figure 6: Foundation Ring Wall & Anchors at Cell Phone Tower





Attachment B

CIP Project Summary

DEKOVEN TANKS REPLACEMENT

PROJECT BACKGROUND

6" CIP

23\$5

The Dekoven Tanks, constructed in 1952, are a critical element of the Zone 3 water distribution system. The existing tanks are 52 and 60 feet in diameter, approximately 48 feet tall and have capacities of 720,000 gallons and 1,000,000 gallons respectively. The tanks are currently operating between 17 feet (pump on) to 30 feet (pump off) and the overflow is located at 47 feet. A recent structural analysis determined the maximum capacity level (MCL) in the tanks should be reduced to 22 feet (from the current 30 feet) to withstand seismic events. However, the District would lose more than half of the tanks capacity and operation staff indicated this may not be feasible during high summer demands. The coatings on each tank are also failing increasing the urgency to rehabilitate or replace the tanks.

Given the seismic vulnerability and the coating failures, the District explored 3 options for rehabilitation / replacement including a) only recoating the tanks and reducing the MCL to 22 feet, b) seismic retrofits to each tank, and c) demolish and rebuild two 800,000 gallon tanks. After a cost analysis of each option and viewing potential construction difficulties, the District determined replacement of the tanks was the best option.

PROPOSED IMPROVEMENTS

Replace the existing 1.0 MG and 0.7 MG tanks with two 0.8 MG tanks.

PROJECT BENEFITS

The Dekoven Tanks Replacement project replaces seismically unsound water tanks with new tanks capable of withstanding seismic events while maintaining existing operating levels.

PROJECT BUDGET

150,000
300,000
450,000
600,000
500,000
400,000
600,000
500,000



10" PVC

DRAWING NAME: J:\CADD\10012.07\CIP 2015-16.08.26-Current.dwg PLOT DATE: 08-26-16 PLOTTED BY: blaurie

(N)

2110

PVC

4001

1610

"LOVC

DEKOVEN TANKSITE

4006 🖷

Attachment C

Sample District Professional Services Agreement

PROFESSIONAL SERVICES AGREEMENT

THIS AGREEMENT is made as of this _____ day of _____, 201___, by and between MID-PENINSULA WATER DISTRICT, a public agency ("DISTRICT") and ______, a California corporation ("CONSULTANT").

WHEREAS, the DISTRICT desires to obtain professional services in conjunction with the ______ Project; and

WHEREAS, the CONSULTANT is ready, willing and able to furnish such services and has submitted a Proposal dated ______, 2015, which is attached hereto and incorporated herein as Exhibit A.

NOW, THEREFORE, THE PARTIES AGREE AS FOLLOWS:

1. <u>PROVISION OF SERVICES</u>

The CONSULTANT agrees to provide professional services to DISTRICT in accordance with the terms and conditions of this Agreement. In the performance of its Services, CONSULTANT represents that it has and will exercise that degree of professional care, skill, efficiency and judgment ordinarily employed by consultants providing similar services. CONSULTANT further represents and warrants that it holds currently in effect all licenses, registrations, and certifications in good standing that may be required under applicable law or regulations to perform these services and agrees to retain such licenses, registrations, and certifications in active status throughout the duration of this engagement.

2. <u>SCOPE OF WORK</u>

The scope of CONSULTANT's work shall be as set forth in Exhibit A. Otherwise, the terms of this Agreement shall control over any contrary provisions of Exhibit A.

3. <u>TERM</u>

This Agreement will commence upon its Effective Date and shall continue until the services set forth in Section 2 are successfully completed, as determined by the DISTRICT. It is understood that the term of this Agreement is subject to the DISTRICT's right to terminate the Agreement in accordance with Section 13 of this Agreement.

4. <u>CONTRACT AMOUNT</u>

The CONSULTANT shall perform all work set forth in Section 2 of this Agreement for a total sum not to exceed \$______ including all labor, materials, taxes, insurance, subcontractor / subconsultant costs, overhead, profit, and all other costs and expenses incurred by CONSULTANT.

5. <u>MANNER OF PAYMENT</u>

The CONSULTANT shall submit monthly invoices as CONSULTANT completes work,

and the invoices shall describe the work completed during the billing period, who performed the services, their applicable hourly rate, and all out-of-pocket costs and subcontractor / subconsultant payments, if any. The DISTRICT shall review and approve the invoices and shall pay approved invoices within thirty (30) days of DISTRICT's approval.

All invoices should be sent to:	Mid-Peninsula Water District
	3 Dairy Lane
	P.O. Box 129
	Belmont, CA 94002
	ATTENTION: Tammy Rudock, General Manager

6. <u>CONSULTANT'S KEY PERSONNEL</u>

It is understood and agreed by the parties that at all times during the term of this Agreement that ______, shall serve as the primary staff person of CONSULTANT to undertake, render and oversee all of the services under this Agreement.

7. <u>DISTRICT REPRESENTATIVE</u>

Except when approval of other action is required to be given or taken by the Board of Directors of the DISTRICT, the General Manager of the DISTRICT, or such person or persons as the General Manager may designate in writing from time to time, shall represent and act for the DISTRICT.

8. <u>CONSULTANT'S STATUS</u>

Neither the CONSULTANT nor any party contracting with the CONSULTANT shall be deemed to be an agent or employee of the DISTRICT. The CONSULTANT is and shall be an independent contractor, and the legal relationship of any person performing services for the CONSULTANT shall be one solely between said parties.

9. <u>OWNERSHIP OF WORK</u>

A. All reports, designs, drawings, plans, specifications, schedules, and other materials prepared by CONSULTANT under this Agreement ("Work Product") shall be the property of DISTRICT.

B. CONSULTANT assigns to DISTRICT all right, title, and interest in and to the Work Product, including ownership of the entire copyright in the Work Product and any causes of action existing or arising in connection with the copyright to said Work Product. DISTRICT shall be entitled to access to and copies of these materials as they are being developed. Any such materials in the hands of CONSULTANT or in the hands of any subcontractor upon completion or termination of services hereunder shall be immediately delivered to DISTRICT. If any property of the DISTRICT is lost, damaged or destroyed before final delivery to the DISTRICT, the CONSULTANT shall replace it at its own expense and the CONSULTANT hereby assumes all risks of loss, damage or destruction of or to such materials. The CONSULTANT may retain a copy of all material produced under this agreement for its use in its general business activities.

10. <u>CHANGES</u>

The DISTRICT may, at any time, by written order, make changes within the scope of work and Services described in this Agreement. If such changes cause an increase in the budgeted cost of or the time required for performance of the agreed upon work, an equitable adjustment as mutually agreed shall be made in the limit on compensation as set forth in Section 4 or in the time of required performance as set forth in Section 3, or both. In the event that CONSULTANT encounters any unanticipated conditions or contingencies that may affect the scope of work or Services and result in an adjustment in the amount of compensation specified herein, CONSULTANT shall so advise the DISTRICT immediately upon notice of such condition or contingency. The written notice shall explain the circumstances giving rise to the unforeseen condition or contingency and shall set forth the proposed adjustment in compensation. Such notice shall be given the DISTRICT prior to the time that CONSULTANT performs work or services related to the proposed adjustment in compensation. Any and all pertinent changes shall be expressed in a written supplement to this Agreement prior to implementation of such changes.

11. **RESPONSIBILITY; INDEMNIFICATION**

CONSULTANT agrees to indemnify, defend and hold harmless the DISTRICT, and its directors, agents, and employees from and against all claims, losses, damages and liabilities (including reasonable attorneys fees) arising out of any injury to persons or property that may occur, or that may be alleged to have occurred, in the course of the performance of the Agreement to the extent caused by CONSULTANT's recklessness or willful misconduct; or by CONSULTANT's negligent provision or omission of services contemplated by this Agreement.

Irrespective of any language to the contrary in this Agreement or under applicable law, CONSULTANT shall have no duty to provide or fund up-front defense costs of DISTRICT against unproven claims or allegations, but shall reimburse those reasonable attorneys' fees, expert fees and all other costs and fees incurred in any judicial proceeding, litigation, arbitration, mediation or other negotiated settlement incurred by DISTRICT that are caused by the negligence, recklessness or willful misconduct of CONSULTANT, its employees, agents and subconsultants (collectively, "Defense Costs"). However, CONSULTANT shall provide its immediate cooperation, at no additional cost to the DISTRICT, to the DISTRICT in defending such claims. Moreover, CONSULTANT's responsibility for the DISTRICT's defense costs shall be limited to the proportion of CONSULTANT's responsibility for the underlying injury as determined in any judicial proceeding, litigation, arbitration, mediation, or other negotiated settlement which addressed the CONSULTANT's responsibility for the underlying injury. In the event that it is determined that the losses, injuries or damages claimed against the DISTRICT did not arise out of, pertain to, or relate to CONSULTANT's negligence, recklessness or willful misconduct, CONSULTANT shall not be responsible for any portion of the DISTRICT's defense costs. This indemnity shall survive the termination of this Agreement.

12. <u>INSURANCE</u>

A. <u>Workers' Compensation:</u> CONSULTANT shall procure and maintain at all times during the performance of such work Worker's Compensation Insurance in

conformance with the laws of the State of California and Federal laws where applicable. Employers' Liability Insurance shall not be less than One Million Dollars (\$1,000,000) per accident or disease. Prior to commencement of work hereunder, CONSULTANT shall deliver to DISTRICT a Certificate of Insurance which shall stipulate that 30 days advance written notice of cancellation, shall be given to DISTRICT.

B. Bodily Injury, Death and Property Damage Liability Insurance: CONSULTANT shall also procure and maintain at all times during the performance of this Agreement General Liability Insurance (including automobile operation) covering CONSULTANT and DISTRICT for liability arising out of the operations of CONSULTANT and any subcontractors. The policy(ies) shall include coverage for all vehicles, licensed or unlicensed, on or off DISTRICT's premises, used by or on behalf of CONSULTANT in the performance of work under this Agreement. The policy(ies) shall be subject to a limit for each occurrence of One Million Dollars (\$1,000,000) naming as an additional insured, in connection with CONSULTANT's activities, the DISTRICT, and its directors, officers, employees and agents. The Insurer(s) shall agree that its policy(ies) is Primary Insurance and that it shall be liable for the full amount of any loss up to and including the total limit of liability without right of contribution from any other insurance covering the DISTRICT.

Inclusion of the DISTRICT as additional insured shall not in any way affect its rights as respects to any claim, demand, suit or judgment made, brought or recovered against CONSULTANT. Said policy shall protect CONSULTANT and DISTRICT in the same manner as though a separate policy had been issued to each; but nothing in said policy shall operate to increase the Insurer's liability as set forth in the policy beyond the amount or amounts shown or to which the Insurer would have been liable if only one interest had been named as an insured.

Prior to commencement of work hereunder, CONSULTANT shall deliver to DISTRICT a Certificate of Insurance which shall indicate compliance with the insurance requirements of this paragraph and shall stipulate that 30 days advance written notice of cancellation, shall be given to DISTRICT.

C. <u>Professional Liability Insurance:</u> CONSULTANT shall also maintain Professional Liability Insurance covering CONSULTANT's performance under this Agreement with a limit of liability of One Million Dollars (\$1,000,000) per claim and in annual aggregate. Such Insurance shall be renewed annually. Prior to commencing work under this Agreement, CONSULTANT shall furnish to DISTRICT a Certificate of Insurance, or certified copy of the Insurance policy if requested, indicating compliance with requirements of this paragraph. Such certificate or policy shall further stipulate that 30 days advance written notice of cancellation, shall be given to DISTRICT.

13. <u>TERMINATION</u>

DISTRICT shall have the right to terminate this Agreement upon thirty (30) days written notice to the CONSULTANT. Upon receipt of such notice, the CONSULTANT shall not commit itself to any further expenditure of time or resources.

If the Agreement is terminated for any reason other than breach of a material term by

CONSULTANT, the DISTRICT shall pay to CONSULTANT all sums actually due and owing from DISTRICT for all services performed and all expenses incurred up to the day written notice of termination is given, plus any costs reasonably and necessarily incurred by CONSULTANT to effect such suspension or termination.

If CONSULTANT breaches a material term of this Agreement and fails to remedy the breach within ten (10) days after the DISTRICT notifies the CONSULTANT of the breach, the Agreement may be terminated immediately and the DISTRICT shall in such event not thereafter pay or allow to the CONSULTANT any compensation for any labor, supplies or materials furnished under this Agreement; and the DISTRICT may proceed to complete this Agreement by other means, and the CONSULTANT shall be liable to the DISTRICT for all loss or damage which it may suffer on account of the CONSULTANT's breach of this Agreement.

14. <u>NOTICES</u>

All communications relating to the day to day activities of the project shall be exchanged between the DISTRICT'S General Manager, or his designee, and the CONSULTANT's Project Manager.

All other notices and communications deemed by either party to be necessary or desirable to be given to the other party, except for confidential reports described in Section 6 of this Agreement, may be given by personal delivery to the representative of the parties or by mailing the same postage prepaid, addressed as follows:

If to the DISTRICT:	Mid-Peninsula Water District 3 Dairy Lane P.O. Box 129 Belmont, CA 94002 ATTENTION: Tammy Rudock, General Manager
If to the CONSULTANT:	<company name=""> <address> <address> ATTENTION: <name></name></address></address></company>

The address to which mailings may be made may be changed from time to time by notice mailed as described above. Any notice given by mail shall be deemed given on the day after that on which it is deposited in the United States Mail as provided above.

15. EQUAL EMPLOYMENT OPPORTUNITY

In connection with the performance of this Agreement the CONSULTANT shall not discriminate against any employee or applicant for employment because of race, religion, color, sex, gender identity, disability or national origin. The CONSULTANT shall take affirmative actions to insure that applicants are employed, and that employees are treated during their employment, without regard to their race, religion, color, sex, disability or national origin. Such actions shall include, but not be limited to, the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms

of compensation; and selection for training, including apprenticeship. CONSULTANT further agrees to include a similar provision in all subcontracts, except subcontracts for standard commercial supplies or raw materials.

16. <u>RECORDS</u>

During the term of this Agreement, CONSULTANT shall permit representatives of the DISTRICT to have access to, examine and make copies, at the DISTRICT's expense, of its books, records and documents relating to this Agreement at all reasonable times.

17. <u>DISTRICT WARRANTIES</u>

The DISTRICT makes no warranties, representations or agreements, either express or implied, beyond such as are explicitly stated in this Agreement.

18. <u>RELEASE OF INFORMATION</u>

CONSULTANT shall not release any reports, information or promotional materials prepared in connection with this Agreement without the approval of the DISTRICT's General Manager.

19. <u>USE OF SUBCONTRACTORS</u>

CONSULTANT shall not subcontract any services to be performed by it under this Agreement without the prior written approval of the DISTRICT, except for service firms engaged in drawing, reproduction, typing and printing. CONSULTANT shall be solely responsible for reimbursing any subcontractors and the DISTRICT shall have no obligation to them.

20. ASSIGNMENT

CONSULTANT shall not assign any of the rights nor transfer any of its obligations under this Agreement without the prior written consent of the DISTRICT.

21. ATTORNEY'S COSTS

If any legal proceeding should be instituted by either of the parties hereto to enforce the terms of this Agreement or to determine the rights of the parties thereunder, the prevailing party in said proceeding shall recover, in addition to all court costs, reasonable attorney's fees.

22. <u>APPLICABLE LAW</u>

This Agreement, its interpretation and all work performed thereunder, shall be governed by the laws of the State of California.

23. <u>BINDING ON SUCCESSORS</u>

All of the terms, provisions and conditions of this Agreement shall be binding upon and inure to the benefit of the parties hereto and their respective successors, assigns and legal

representatives. CONSULTANT shall not assign this Agreement without the prior express written approval of the DISTRICT.

24. <u>WAIVER</u>

Any waiver of any breach or covenant of this Agreement must be in a writing executed by a duly authorized representative of the party waiving the breach. A waiver by any of the parties of a breach or covenant of this Agreement shall not be construed to be a waiver of any succeeding breach or any other covenant unless specifically and explicitly stated in such waiver.

25. <u>ENTIRE AGREMENT; MODIFICATION</u>. This Agreement, including any attachments, constitutes the entire Agreement between the parties with respect to the subject matter hereof, and supersedes any prior understanding or agreement, oral or written, with respect to such subject matter. It may not be amended or modified, except by a written amendment executed by authorized representatives by both parties. In no event will the Agreement be amended or modified by oral understandings reached by the parties or by the conduct of the parties.

26. <u>COMPLIANCE WITH LAWS AND REGULATIONS</u>

During the progress of the work, CONSULTANT shall fully adhere to all applicable State and Federal laws and county, municipal or DISTRICT ordinances and regulations which in any manner affect those engaged or employed in the work, or the materials and equipment used in the work, or which in any way affect the conduct of the work. CONSULTANT, and any subcontractors performing any work under this Agreement, shall hold such licenses as may be required by the State of California for the performance of the work specified in this Agreement.

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IN WITNESS WHEREOF, the parties hereto have executed this Agreement by their duly authorized officers as of the day and year first above written.

DISTRICT:	CONSULTANT:
MID-PENINSULA WATER DISTRICT	CONSULTANT NAME
By:	By:
Name:	Name:
Title:	Title:
	Ву:
	Name:
	Title:
	*NOTE: This Agreement must be executed by two corporate officers, consisting of: (1) the President, Vice President or Chair of the Board, and (2) the Secretary, Assistant Secretary, Chief Financial Officer, Assistant Chief Financial Officer, or by any person authorized by the corporation to execute written contracts.