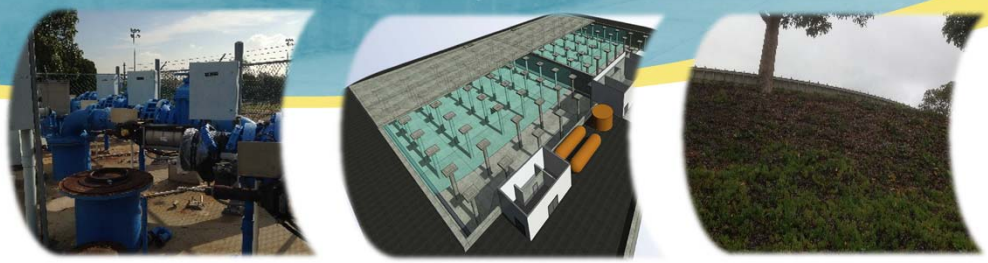
PREPARED FOR
CITY OF MANHATTAN BEACH

City of Manhattan Beach
Peck Ground Level Reservoir Replacement Design
RFP No. 1061-16

Revised March 21, 2016



PROPOSAL

MWH®

PAGE INTENTIONALLY BLANK

TABLE OF CONTENTS

SECTION PAGE

PAGE INTENTIONALLY BLANK

MWH

BUILDING A BETTER WORLD

February 10, 2016

Mr. Michael Guerrero
Principal Civil Engineer
City of Manhattan Beach Public Works Yard
3621 Bell Avenue
Manhattan Beach, CA 90266

Re: Request for Proposal (RFP) for Professional Engineering Services for the Design of Peck Ground Level Reservoir Replacement (RFP 1061-16)

Dear Mr. Guerrero:

MWH Americas, Inc. (MWH) in association with Hazen and Sawyer (Hazen) and other Subconsultants are very pleased to submit our response to RFP 1061-16. We recognize how important this project is to the City of Manhattan Beach and the Consultant you select for this project must bring significant and specialized expertise in the design of reservoirs, pump stations, and pipelines for storage and distribution facilities. We also believe that your selected consultant must also have a proven ability to work collaboratively with the City and with the public in order to meet the desired objectives. In preparing this proposal, we studied the RFP carefully, visited the project site, reviewed other available documents in detail, and understand that the key objectives associated with this project are:

1. Effectively Improve the Water Quality of the Distribution System
2. Complete the Project with an Accelerated Schedule to Minimize Impacts to the water system and public
3. Be a "Good Neighbor" by maintaining public satisfaction throughout the project

We are very interested in conducting this work for the City and feel we have the proven resources, experience, and management approach to achieve all project objectives. You will find there will be no "learning curve" with our team and if selected, we are prepared to start immediately upon authorization.

MWH Team Advantages:

- Extensive local team experience with reservoirs, pump stations, and pipelines
- Experience managing similar project tasks concurrently
- Project manager with extensive experience managing large similar projects and design teams
- Significant Local Resources
- Consistent Successful Projects with Budget Savings to Clients
- Knowledge of all Local Agencies

Highlights of our approach and our proposed team include:

- A keen understanding of the importance of this project to the City;
- Project Team members with extensive experience in reservoirs, pump stations, and transmission pipelines;
- The necessary resources and manpower to immediately get this project underway to accelerate the project schedule;
- In-place project management to be used to successfully manage and control project outcomes;
- Our commitment to meet all project objectives.

Individuals Deliver Successful Projects. MWH has developed a Team of experienced designers with unique knowledge of this project. Our Team transcends company boundaries to successfully deliver this project. Our proposed Project Manager, Miko Aivazian, PE, has more than 28 years of experience in design and construction of water storage reservoirs (including steel, pre-stressed, and cast-in-place concrete reservoirs), also brings extensive experience in all aspects of design of reservoirs, pump stations, and pipelines. Miko has managed several reservoir projects from preliminary site evaluations through reservoir type selection, final design and construction. Miko recently completed the construction of the 16.0 MG Evans Reservoir for City of Riverside Public Utilities Department.

Miko also completed the construction of the 15.0 MG Chevy Chase Reservoir and Pump Station Replacement Project for the City of Glendale Department of Water and Power (GWP) in 2009. Miko managed this project from proposal phase to preliminary design, final design and construction. Miko has also managed the design and construction of at least one dozen reservoirs for major clients in southern California region such as Los Angeles Department of Water and Power, City of Glendale, City of Riverside, and City of South Pasadena.

Miko will be supported by Project Engineer Matthew Huckaby, PE. Matt has multiple discipline (civil/structural) background for this type of project. Our Civil and pipeline lead, Jerry Gantney, PE, PLS has extensive experience in reservoir and storage facility site development. George Tey, PE who has over 24 years of experience in pump stations will lead the mechanical work. Miko, Matt, Jerry, and George have worked together on many reservoir and pump station projects for the past 25 years including the Evans Reservoir, Chevy Chase 968 Reservoir and pump station, Saint Joseph Reservoir, and several other local projects.

We look forward to working with you and your staff to provide professional engineering services to the City. If you have questions or require further information, please contact Miko Aivazian at 626.568.6003.

Individual Authorized to Represent Proposer:
Miko Aivazian, PE
Contract Manager/Project Manager
300 N Lake Ave., Suite 400
Pasadena, CA 91101
Direct: 626.568.6003
Cell: 626-379-2370
Fax: 626. 568.6101

Sincerely,

MWH Americas, Inc.

Eric Mills, PE
Vice President, Area Manager
Principal-In-Charge

Miko Aivazian, PE
Principal Engineer
Project Manager

1.0 Methodology and Work Plan

1.1 Introduction

Built in 1957, Peck Reservoir has exceeded its useful life. Peck Reservoir is a partially buried structure that has a 4-inch thick 1-1/2:1 side slopes and 4-inch thick reinforced concrete floor. It was originally constructed with interior reinforced concrete columns and cast-in-place reinforced concrete roof. Due to deterioration, the original concrete roof was replaced with a light framed steel standing seam metal roof in 2000, with additional interior concrete structural supports constructed during this roof replacement project. The metal roof has deteriorated beyond repair and the existing reservoir has no mechanical ventilation system to control condensation and temperature within the reservoir. This adversely impacts the disinfection residual of stored water as well as causing corrosion of metallic surfaces. Despite attempts to repair leaking concrete slopes and floor, the reservoir continues to leak and cannot be filled beyond 15 feet of the 20 feet of available storage. Due to the sloping sides of the reservoir the loss of the upper 5 feet of storage has a disproportionate impact on reservoir capacity.

Existing Peck Reservoir

The Peck Booster Station was originally constructed in 1957 at the same time as Peck Reservoir. During periods of high demand, the pumps turn on to supplement the water entering the system from the Block 35 Booster Pump Station facility. Currently the pump station consists of four (4) 3 stage submersible turbine pumps, and each pump is equipped with a submersible motor. The electric motors are equipped with variable frequency drives (VFD). Each pump/motor location includes an automatic control valve. The pump station has a permanent standby diesel generator and automatic transfer switch. The City's water system is managed and monitored by the Rockwell RSU Supervisory Control and Data Acquisition (SCADA) equipment. Based on the new regulations, submersible pumps and mechanical equipment within a potable water reservoir is not permitted.

The City is planning to replace the existing Peck Reservoir and Booster Station with a new reservoir and pump station and improve the water quality and operations of the distribution system. Our approach for this project will ensure the City a successful and cost effective project that will meet the objectives set for this project.

The MWH Team brings a unique group of engineering professionals who can provide a complete array of services to the City. The Team has the proven experience in reservoir design and water facilities such as pump stations, pipelines, disinfection, water treatment systems, and power generators.

Existing On Site Booster Pump Station

We understand the significance of the Peck Reservoir being off line during the construction phase of the project. We recognize the City will have to rely on the MWD water supply or other neighboring emergency connections during construction to make up the loss of Peck Reservoir. We have the knowledge and expertise on how to reduce the down time with our options to build one of the reservoir cells and pumping station ahead of the rest of the reservoir completion will minimize the reservoir down time. This option is discussed in more detail below.

1.2 Methodology and Approach

Our approach to this project is based on the information provided by the City. We have developed alternatives that will enhance this project, save costs, and improve operational flexibility and water quality. These enhancements are described in detail later in this Section. In addition to the information provided by the City, we also rely on our observations from our site visits, our internal expertise across the country, and our detailed evaluation of the 2010 Water Master Plan. We also reviewed the 2015 Hazen and Sawyer Disinfection Residual Stability and Regulatory Compliance Draft Report. Based on this report and the required storage for meeting the emergency, fire flow and peak daily storage requirements have evaluated a volume of 8.0 MG and a pumping capacity of 6,850 gallons per minute (gpm). In addition to replacing the existing facilities, the City desires to provide a location for future treatment capacity for up to 4000 gpm (sufficient capacity for both wells) to remove iron and manganese from the well water. Additional space for such treatment has also been reviewed. Figure 1 in the following pages is a preliminary rendering of the proposed facilities. Figures 2 and 3 is our recommended options for a detached above ground pump station and an attached pump station with a two cell reservoir (2 – 4.0 MG cells) for Peck Reservoir facility and the planned space for the future manganese treatment.

We have developed a 3-Dimentional model of the site using the Building Information Model (BIM) presented in Figure 1. The BIM model can be developed and used to prepare working drawings. The model can provide:

- *Working design drawings (plans and sections)*
- *Quantity Take-offs*
- *Material Take-off for cost estimating*
- *Asset management*

Specific features of our two options are described in the following paragraphs.

1.2.1 Reservoir Option 1

For this option, the new 8.0 MG reservoir will utilize a 15 foot vertical wall and a 5:1 slope (horizontal to vertical) forming a hopper bottom, but lower depth of the reservoir by about 2.5 feet to achieve the necessary volume. The bottom elevation will be at elevation 72.50 for a total water depth of 22.5 feet. The hopper bottom will reduce the wall heights resulting in construction cost savings. As shown in Figure 2, this option will include a free standing above ground detached pump station and electrical building. The building architecture will blend in with the adjacent structures.

The site work for Option 1 would remove the old reservoir, paving, pump control and disinfection building, out-door equipment and replace it with a new pump station buildings. The new pump station building would house the pumps, electrical equipment, disinfection, and office. A new access ramp down to the driveway at south east corner on 18th Street will be evaluated. This access ramp allows the service vehicles to leave or enter the site without turning around. A new retaining wall will be considered to allow the south side for the new facilities.

Reservoir access will be provided by two access hatches. Each access hatch will have a stair way cast into the concrete side slope along with a stainless steel hand rail for safety.

1.2.2 Reservoir Option 2

This option with an attached pump station is shown in Figure 3. To achieve the necessary volume, the bottom will be at elevation 70.00 for a total water depth of 25 feet. The bottom will slope at a 5:1 slope forming a hopper bottom. This hopper bottom allows the side water depth to remain approximately 20 feet which reduces the construction cost of the sidewall.

This option provides a new attached pump station, disinfection, office and electrical controls facilities all in one building. The new pump station building will share a common wall with the reservoir and would house the pumps, electrical equipment, disinfection, and office. The lower level of the pump station room will be lower than the reservoir by approximately 5 feet to cater for the inlet piping from the reservoir sumps to the pumps and provide a positive suction head to take advantage of the full reservoir storage volume.

A new access ramp down to the driveway at south east corner on 18th Street will be evaluated. This access ramp allows the service vehicles to leave or enter the site without turning around. A new retaining will be considered to allow the use of the space south of the reservoir and pump station building for the new facilities.

Reservoir access will be through the pump station building. This provides a secure means to limit the access to the reservoir interior. The reservoir access will be provided by cast concrete stairs along the south reservoir wall along with a stainless steel hand rail for safety. An equipment hatch with an access ladder will also be provided. An access hatch will also be provided at each overflow box to allow for cleaning and repairs.

1.2.3 Other Project Features

Improving Water Quality is a very significant element of this project. The MWH Team is uniquely qualified to provide the water quality Task requested in the RFP. Silvana Ghiu, PE was the author of the 2015 Draft Disinfection Residual Stability. Mrs. Ghiu's knowledge and involvement on the project allows the Team to quickly update and evaluate the City's water quality issues as well as familiarity with the City's hydraulic model.

MWH will independently review the water quality study as a "cold eye" and make additional recommendations. The City's 2010 Water Master Plan has recommended 8 MG reservoir storage capacity for the Peck Reservoir and one of the water quality scenarios suggest the age of the water in the Peck Reservoir during periods of low demand causes the water to age and diminishes the water quality. This led to recommending a smaller reservoir volume. The Peck Reservoir Replacement, including replacing of the pump station and disinfection system will allow during the predesign phase to review the new disinfection system and will evaluate implementing chloramination to comply with the Stage 2 Disinfectant and Disinfection Byproduct Rule, Total Coliform Rule and Groundwater Rule. Improving reservoir mixing can also improve water quality. The design of the reservoir inlet piping and circulation within the reservoir is also discussed below

Site Improvements will add a driveway and ramp to allow the service and delivery vehicles to move through the site without requiring them to back in or turn around. A preliminary review of the access ramp assumes a 15% ramp will fit with a ramp length of approximately 80 feet. It is assumed the disturbed landscaping will be restored on the site, except the south side where the extensive improvements will be needed. New landscaping will be provided to finish the disturbed areas not paved or enclosed by walls. Other site improvements will be to remove and replace the existing valves and vaults as requested in the RFP.

Future Iron and Manganese Treatment Facilities: space will be provided for two new greensand filters in pressure vessels, approximately 8 foot diameter by about 27.5 feet long, a future electrical and mechanical control building and a backwash recirculating backwash pump, a backwash waste tank and chemical dosing facilities needed for the manganese treatment system.

Accelerated Reservoir in Service Date: can be achieved by constructing one cell (4.0 MG) and the pumping station facility first. Then complete the second reservoir cell, remaining piping and site work. This option will provide the City with a schedule benefit by allowing 4.0 MG of storage and the pump station to be completed ahead of the complete project. This will allow the first 4.0 MG water storage and return the City's water supply to near normal. The savings to the City will be in using less MWD purchased water by using well water for the City's water supply. The second reservoir cell can be brought back in service in time for the peak summer use when more storage is needed. *This same concept on Chevy Chase 968 Reservoir and Pump Station resulted in placing the first half of the reservoir in service within 12 months.*

Hopper bottom vs. flat bottom floor system: All concrete reservoirs typically have either a flat bottom (minimum of 1 percent slope for cleaning) or hopper bottom (a 5:1 slope for proper subgrade preparation and concrete placement). The hopper bottom reservoirs are usually the most economical because they provide maximized storage for the total water depth and minimize wall height and wall thickness. This option results in substantial savings when wall heights exceed 20 feet. *The hopper bottom reservoir designed for the Chevy Chase 968 Reservoir Project resulted in substantial savings for the City of Glendale.*

Reservoir Floor Slab Construction: There are several alternatives for design and construction of the reservoir floor slab. It is believed the existing conditions under the original reservoir are suitable for replacement in kind. It is known the existing reservoir is leaking. The extent of the reservoir leaks into the surrounding soil under the existing reservoir is unknown at this time. A geotechnical investigation which samples the soils near the existing reservoir will reveal the suitability of the existing soil. It is assumed any damage due to the leaking water from the reservoir will be repaired. A relatively thin membrane floor slab may be utilized. The design of the floor slab will be primarily controlled by internal temperature and shrinkage stresses on the concrete. Attention should be directed to changes in the thickness of the floor slabs at internal columns and perimeter walls to minimize cracking due to internal stresses. Attention will also be directed to restraint in the floor slab to internal shrinkage forces by the subgrade materials.

Typical Checkered Board Reservoir Roof Pattern

Reservoir Roof Slab Construction: We will examine a conventional two-way flat slab design supported by internal columns spaced at approximately 20 feet on center. This roof will allow the City the option to make use of the roof area for installing solar panels or other uses. If the City does not wish to keep this option open, we can also consider a slightly higher profile roof without interior columns wall-to-roof connections must be capable of transferring lateral seismic forces while not restraining the roof slab from internal shrinkage stresses. We recommend the City first consider their planned use(s) for the reservoir roof. For example, if considering installing solar panels, a flat roof may be recommended; if no use is planned, a pre-manufactured aluminum domed roof may be a more viable and less expensive option when considering aboveground reservoirs. We will obtain cost estimates of roof options to ensure the selected roof system is both functional and cost effective. *For the 16 MG Evans Reservoir Roof Replacement Project, our team evaluated 12 options and selected an aluminum roof for its life expectancy and reduced seismic forces due to lighter weight of aluminum.*

Reservior Inlet Pipe Wall Penetration

Inlet Piping: The existing reservoir inlet pipeline is a 14 inch diameter pipe. The new inlet pipeline will be up sized to a 14 to 16-inch diameter inlet pipe and will connect to the reservoir inlet header at the floor level. The inlet pipe will have a flexible joint before penetrating the reservoir wall and a pipe wall seal will be used to anchor the pipeline into the wall. The inlet header will be configured to provide an even flow distribution around the reservoir to allow for circulation from the bottom. The final location of the inlet header will be confirmed during the preliminary design and using a CFD model (refer to optional Task 21). Mechanical mixers will also be provided to enhance water circulation.

Reservoir Overflow Piping: There are two options available for the reservoir overflow piping:

1. A steel, cement-mortar-lined and epoxy coated pipe with an enlarged funnel. This option requires recoating and maintenance with age.
2. A concrete overflow structure supported from the reservoir wall. The advantage of this option is that it requires no maintenance.

Reservoir Overflow Airgap at St. Joseph Reservoir

It is standard practice to provide a reservoir overflow pipe that is at least the same size as the reservoir inlet pipe. The overflow pipe must be able to handle the same flowrate as the inflow to the reservoir. The reservoir overflow will also be equipped with a Department of Drinking Water approved air-gap structure that will prevent contamination of stored water.

Reservoir Circulation and Water Quality: Water circulation in the reservoir influences the water quality. We will provide an inlet/outlet piping layout that will ensure proper turnover within the reservoir. The two cell layout provides a smaller volume to circulate. A properly designed inlet/outlet piping system will enhance water quality within the reservoir and will reduce the amount of chemicals used.

Inlet/Outlet Piping Layout

Water quality problems develop for two main reasons:

1. The entire tank volume is not mixed completely.

2. The oldest water in the tank cannot be drawn from the tank due to the location of the outlet pipe.

This results in dead zones and a localized increase in water age; water quality problems develop that include loss of residual, bacterial regrowth, disinfection by-products formation, elevated nitrification, and variances in dissolved oxygen and pH.

To eliminate short circuiting, a separate inlet and outlet is recommended. However, a solid understanding of the mixing and circulation patterns within the tank is required in order to know where to locate the outlet pipe.

For this project, the outflow from the proposed reservoir will be pumped to two different pressure zones: zone 400 and zone 555. We will carefully evaluate the reservoir turnover and will ensure proper water circulation during normal operations. We will discuss with the City the need for Computational Fluid Dynamics Modeling (CFD) if needed.

Other options to be considered will be the use of low power mixing systems such as Solar Bee or other types of mechanical mixers. We recommend these options be considered during the preliminary design phase of the project and implemented if necessary.

We will provide the City with a detailed study of the reservoir interior piping that will ensure a reliable and effective design.

Reservoir Drain Piping: Reservoirs are typically dewatered every 5 to 7 years in order to be washed down and cleaned. We recommend a 12-inch reservoir drain line with a 12-inch valve to be adequate for this purpose for each reservoir cell. This valve is typically closed and is only operated when the reservoir is dewatered. We also recommend the drain line be placed in the same vault as the reservoir outlet pipe and the sump equipped with a concrete curb and mud gates to prevent sand from migrating into the pumps and distribution system.

Drain Sump and Valve

Reservoir Underdrain Piping: To remove any water from around the walls and under the reservoir, and also to detect any reservoir leaks, a multi-zone perforated underdrain piping network is highly recommended. We will incorporate into our design a complete underdrain

system equipped with an observation manhole that may be easily monitored by the operations staff. We recommend a multi-zone underdrain system. The multi-zone undrain system will assist in locating leaks and verifying the reservoir is sound. If there is a leak, the zone can be identified and possibly located on the project plans before repairs can begin.

Reservoir Wash-down Piping

Reservoir Wash-down Piping: For improved operational purposes, we recommend a 4-inch diameter wash-down water supply line to be installed at various locations inside the reservoir. The main purpose of this line would be to assist the operations staff when washing the reservoir walls and floor slab. This line may be connected to the pump station discharge piping in order to have adequate pressure when used.

Reservoir Roof Vent with Exhaust Fan

Reservoir Ventilation: Ventilation of the reservoir will be through roof vents with exhaust fans. The fans will insure dry air is present in the reservoir to avoid potential corrosion. The size and number of vents will be determined during the BODR. Typical reservoirs do not need motorize vents. However, the history of the existing Peck Reservoir suggests the moist ocean air may require more ventilation to minimize the corrosive effects of the ambient air by providing a motorized exhaust vent.

Booster Pump Station Layout and Footprint: The proposed pump station layout shown in Figure 3 utilizes a common wall between the pump station and the reservoir. This reduces the footprint of the pump station on an already tight sight. The pump station inlet is near the reservoir side wall and reduces some of the yard piping and the pump station inlet is below the reservoir floor for net positive suction.

We have examined in detail the possibilities for building a similar sized reservoir with more volume than the current 7.5 MG by lowering the bottom of the current reservoir by approximately 3 to 5 feet to achieve the RFP requested 8.0 MG by constructing a medium vertical wall of about 20 feet and a 5:1 hopper bottom. The new reservoir will replace the existing reservoir, including the concrete lining, short vertical wall and roof system with sufficient concrete thickness, water tight joints and roofing system. In addition, a two cell system is recommended. The new pump station will be enclosed with the control building and electrical enclosure will be located at the approximate same location as the existing control building. *This option will provide the City minimum disturbance of the existing site and provide the desired storage capacity and provide the two cell storage flexibility for reducing the water aging in the reservoir and increased circulation with a smaller reservoir volume.* This option would have the following advantages:

- The construction cost for an 8.0 MG sloped side wall with a poured-in-place floor and short vertical wall reservoir will be considerably less cost than building a vertical walled cast-in-place concrete reservoir.
- Significant savings associated with a reduced construction schedule. An 8.0 MG reservoir can easily be constructed in 15 to 18 months (we have verified this with several local contractors). Miko Aivazian recently completed construction of a 15.0 MG poured-in-place reservoir for the City of Glendale, GWP. *This 2-cell reservoir and pump station was completed and placed into service in less than 18 months.* We have contacted pump manufacturers and have verified that the pump procurement will take approximately 12 to 16 weeks for delivery and installation. This is considered in our construction schedule.

The pump station will house 3 vertical turbine pumps and 1 standby. The pump and motor assembly will be set such that the motors can be directly on top of the pumps or at a separate level. For either case, MWH will provide access hatches for easy

removal and replacement of pumps and motors. MWH will present pump station layout options for the City to consider. MWH will also consider a new emergency generator and Automatic Transfer Switch (ATS) for this project.

Architectural Treatments to Minimize Site Impact: The community surrounding the site includes residential single family housing, park and school uses. We will incorporate into the design of the pump station building an architectural theme to blend in with surrounding environment and improve the aesthetics of the site. Other possible architectural site treatments to inexpensive architectural treatments for the pump station and the reservoir exterior surfaces combined with landscaping will provide much improved aesthetics of the site. *Miko Aivazian has provided similar concepts on a previous project for the City of Arcadia's St. Joseph Reservoir.* Based on this past experience, we can provide the City with several renderings that will show what the site will look like. MWH's in house architect, Chuck Young, AIA and in house landscaping architect, Scott Radford, ASLA, will provide these services for this project.

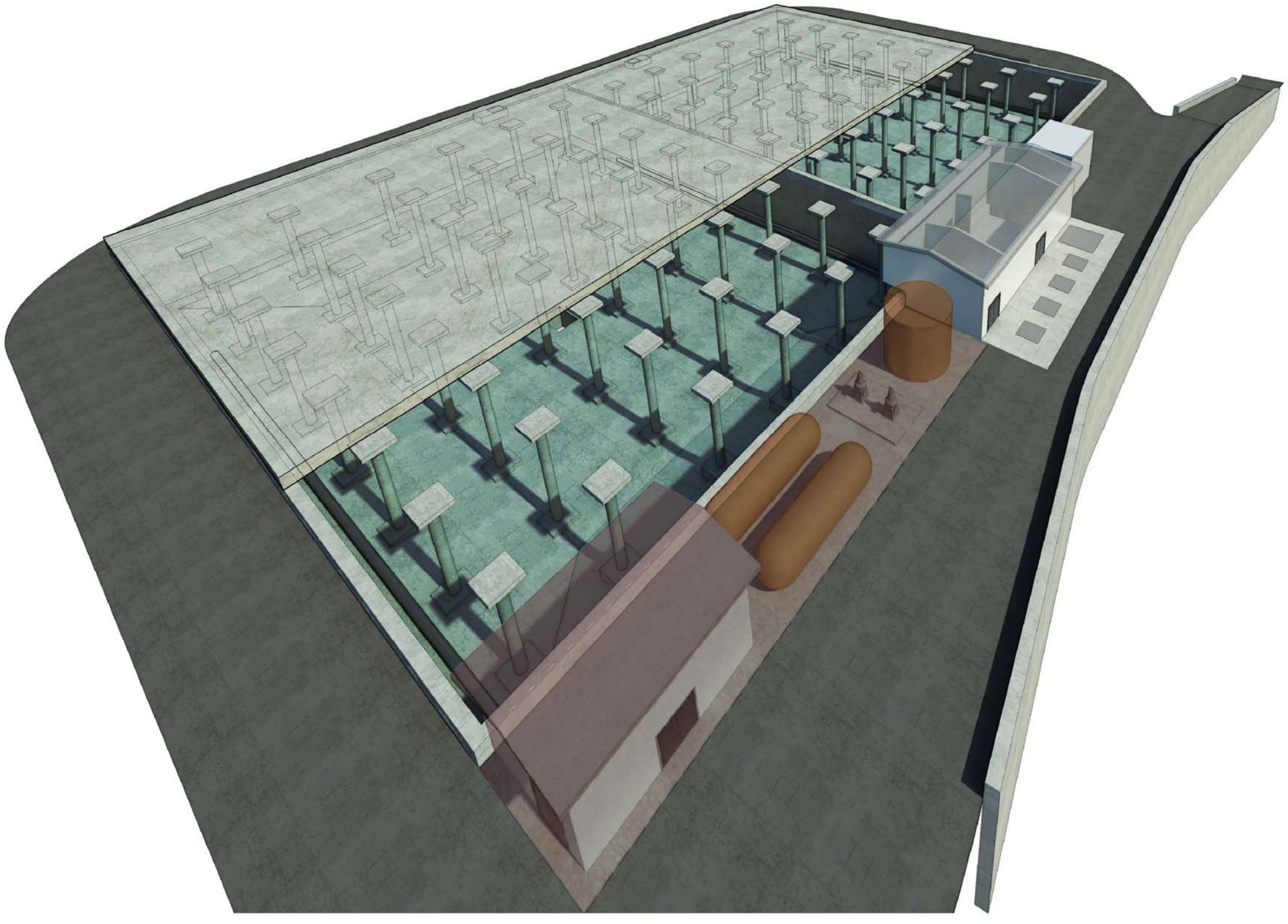
St. Joseph Reservoir Architectural Finishes

Public Outreach: An important aspect of this project is community outreach both during the design phase as well as the construction phase. Lynn Grijalva, PE will lead the MWH Team. Lynn has extensive experience meeting the public and City officials such as the City Council from her background as a former water agency regulator. She is ideally suited to provide the presentations and respond to technical questions. Other aspects of public outreach task will be done in the background by a public outreach professionals to maintain a web site for public information distribution, meeting notices, answers to questions discussed in the community meetings, and construction progress, notice of road work, hours of work and other useful public outreach information. Another useful tool is to use a web site for showing the construction progress on web camera during the construction activities.

Typical elements of the public outreach program for this project may include:

- Community meetings, workshops, presentations, etc.
- Invitations to meetings, newspaper ads, etc.
- Newsletters before and after construction
- Project webpage
- Briefings/meetings with City Council
- Letters, and other notifications
- Traffic alert notices during construction

PAGE INTENTIONALLY BLANK



IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1

MWH/Hazen
300 N. LAKE AVE.
PASADENA CA.

PECK AVENUE RESERVOIR

3D RENDERING

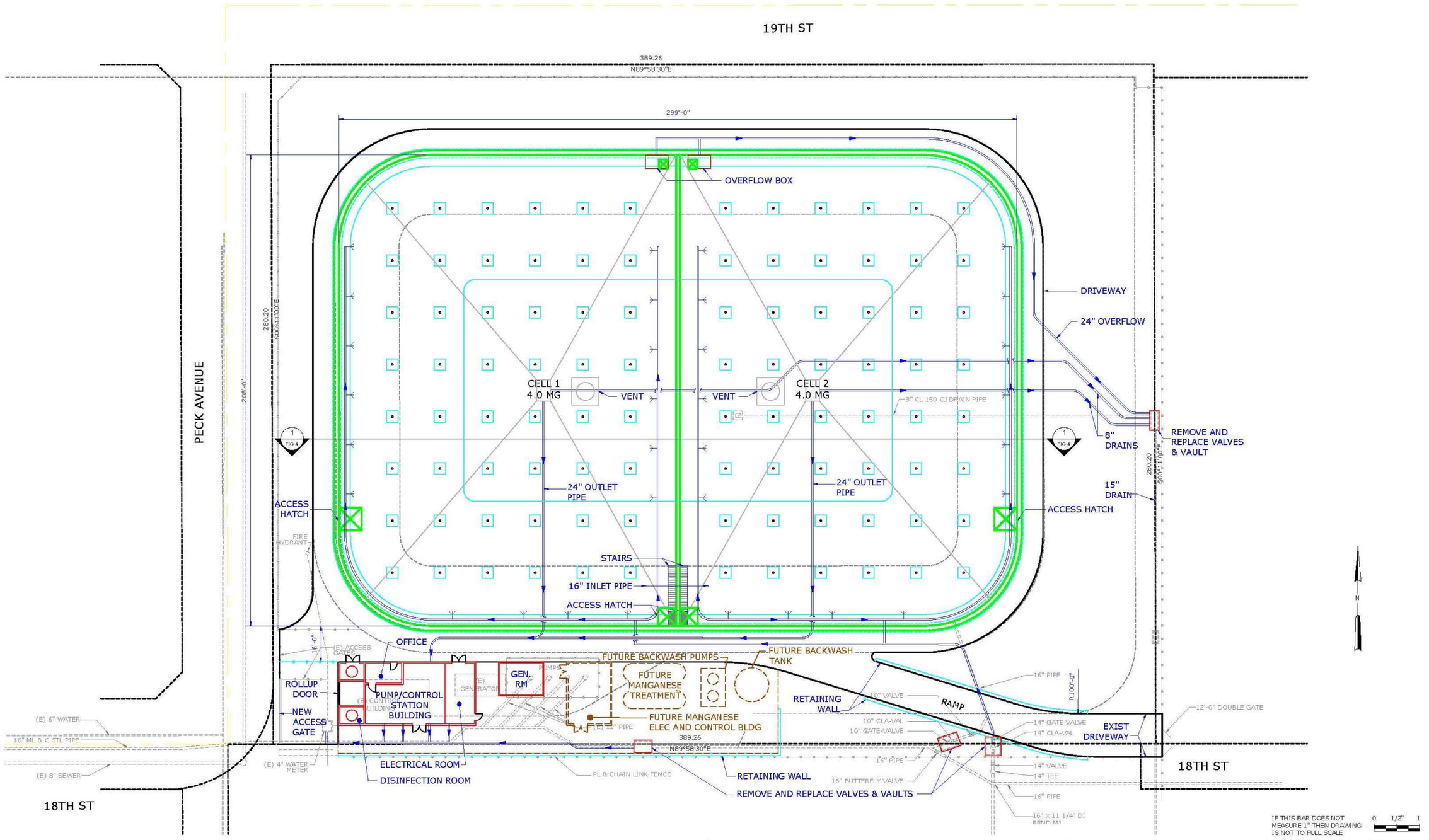
DATE: FEBRUARY 201

1008-15

CONTRACT NO.:

FIGURE NUMBER:

FIGURE 1



OPTION 1 - FLOOR PLAN

1/16" = 1'-0"

MWH/Hazen

300 N. LAKE AVE.
PASADENA CA.

PECK AVENUE RESERVOIR

OPTION 1 - SITE PLAN

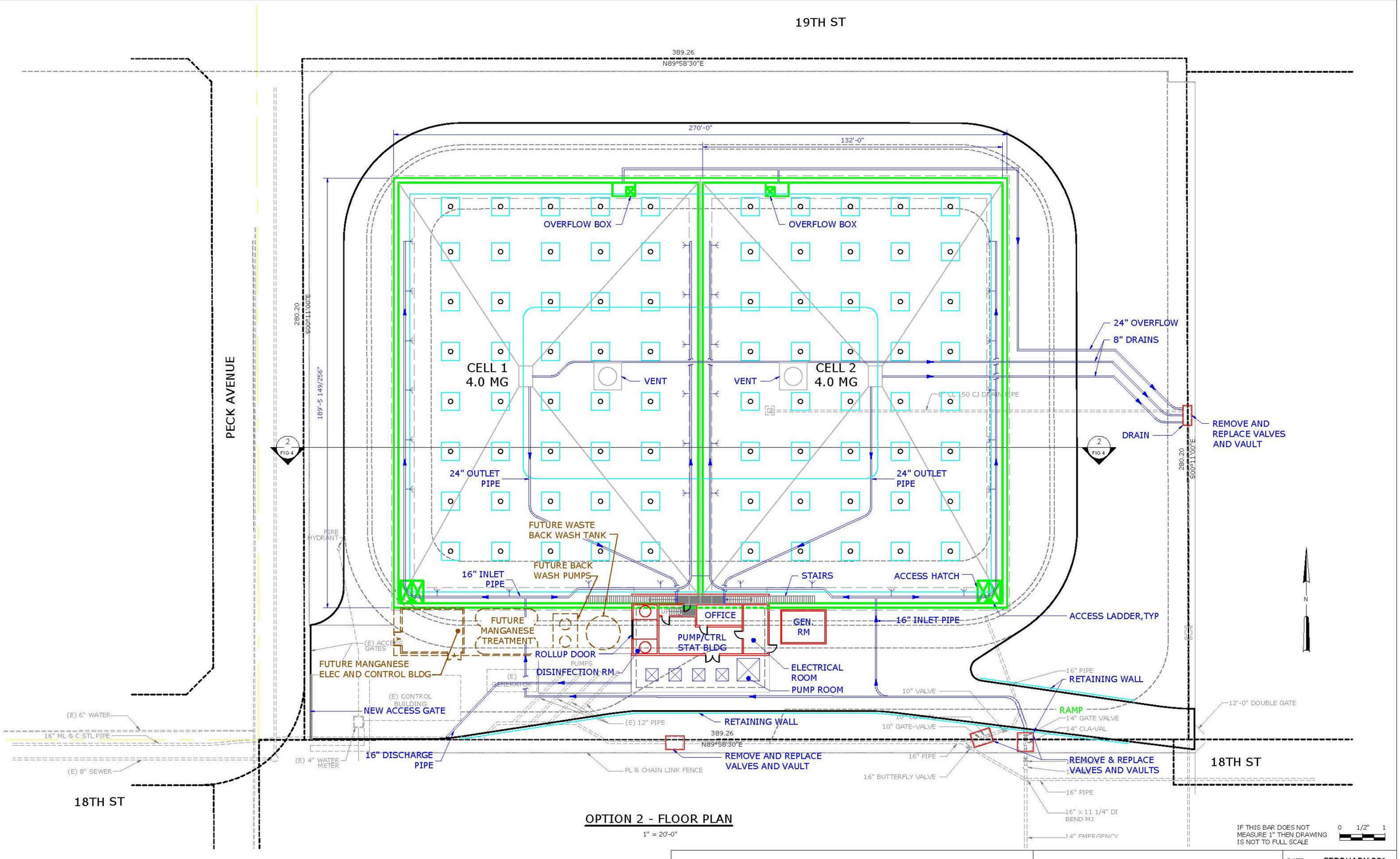
DATE: FEBRUARY 201

1008-15

CONTRACT NO.:

FIGURE NUMBER:

FIGURE 2



OPTION 2 - FLOOR PLAN

1" = 20'-0"

MWH/Hazen

300 N. LAKE AVE.
PASADENA CA.

PECK AVENUE RESERVOIR

OPTION 2 - SITE PLAN

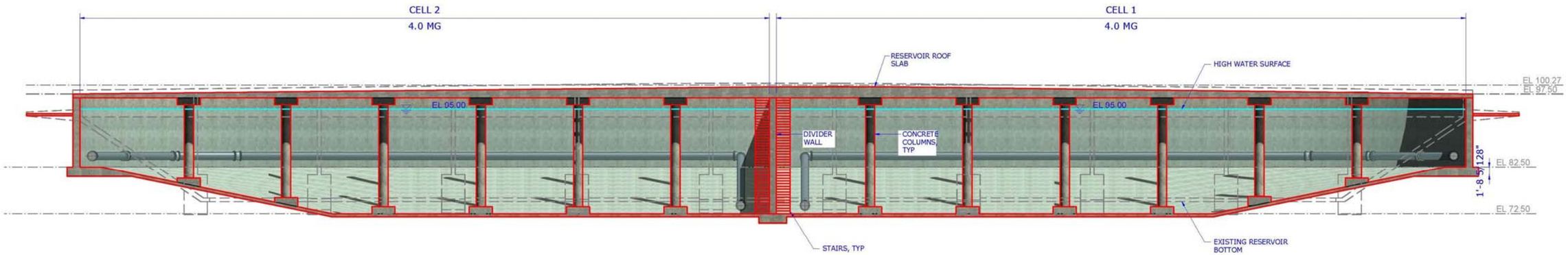
DATE: FEBRUARY 201

1008-15

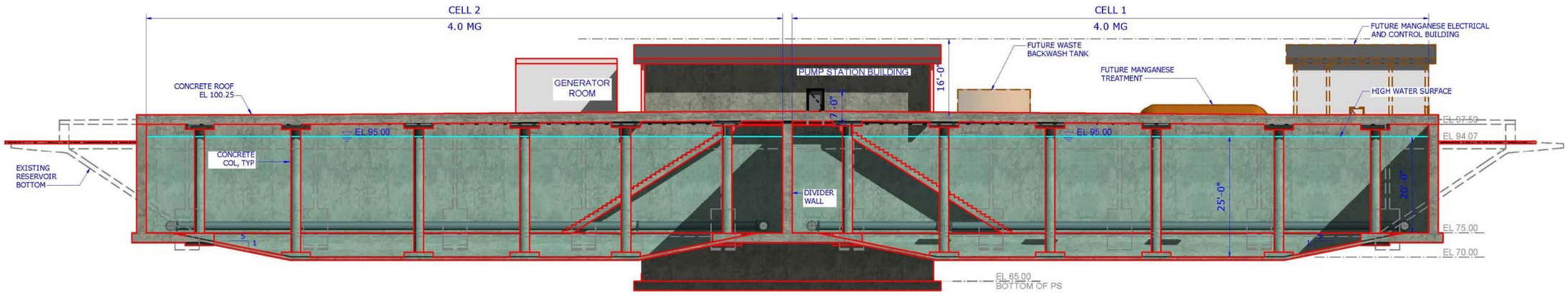
CONTRACT NO.:

FIGURE NUMBER:

FIGURE 3



SECTION 1
3/32" = 1'-0"
S-100



SECTION 2
3/16" = 1'-0"
FIG 3

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1

MWH/Hazen
300 N. LAKE AVE.
PASADENA CA.

PECK AVENUE RESERVOIR

OPTION 1 & 2 - SECTIONS

DATE: FEBRUARY 201
1008-15
CONTRACT NO.:
FIGURE NUMBER:
FIGURE 4

2.0 Scope of Services

MWH will provide geotechnical, land surveying, civil, structural, mechanical, and electrical/instrumentation engineering services for the design of the Peck Reservoir and Pump Station Replacement Project and will take the project from inception to commissioning of the new reservoir and pump station.

The scope of work below is based on the City's requested services in the RFP and our best understanding of the project, including the review of available documents. We have detailed below Scope of Work necessary to deliver a successful project.

2.1 Scope of Work

Task 1 – Project Management and Meetings

Task 1.1 – Project Kick-off Meeting: Prior to beginning the work, MWH will coordinate and participate in a project kick-off meeting with the City staff. MWH will prepare the meeting agenda and meeting minutes for the kick-off meeting. The Kick-off meeting will be attended by the MWH Project Manager, Project Engineer, and key subconsultants as necessary.

Task 1.2 – Monthly Coordination Meetings: MWH will attend regularly scheduled meetings with the City staff to review the work in progress, report issues and concerns, and receive comments on the engineering report/study documents as needed. MWH will prepare all meeting agenda and minutes and will submit to the City on a timely manner. All meeting minutes will be distributed within two working days of the meeting. Design coordination meetings will consist of five (5) monthly coordination meetings during the preparation of the Basis of Design Report and nine (9) meetings during the final phase of design. We anticipate a total of fourteen (14) meetings for estimating purposes. The MWH Project Manager will attend each monthly coordination meeting and other MWH staff and key subconsultants will attend as determined to be necessary by the MWH Project Manager.

Task 1.3 – Weekly Project Updates: Our project manager, will provide project status updates via email to the City's designated project manager on a weekly basis. This weekly status update will be used to confirm work progress, identify critical information needs, and where appropriate alert the City to any potential issues which may impact the project scope, schedule or budget. These weekly project status updates will be supplemented with monthly project status reports that will be prepared and distributed along with MWH's invoices.

Task 1.4 – Quality Assurance and Quality Control Program: MWH will provide quality assurance and quality control (QA/QC) reviews through the course of the project consistent with City's policies. Our QA/QC and quality management procedures establish and maintain a structure for providing reviews of all work products and adherence to industry design standards. Specific efforts for this project will include:

- Development of a Project Management Plan, which defines the project scope, approach, deliverables, schedule, budget and provides a basis for QA/QC and technical reviews
- Conformance to City's drafting and design standards, guide specifications and standard details
- Internal constructability review prior to each submittal
- Review of all calculations by appropriate reviewers independent of the project design team prior to each submittal

All work product deliverables, including detailed checking of work by in-house staff will be reviewed prior to submittal to the City. Technical reviews will include reviews for code compliance, safety, operability, constructability, bid-ability, errors/omissions and clarity.

Task 1.5 – Monthly Progress Reports: MWH will attend monthly progress meetings with the City staff. MWH will prepare and submit monthly progress reports as work is performed. The progress reports will include major accomplishments for the

reported period, significant problems and proposed solutions, pending issues, budget, schedule, and any issues with contractual requirements. MWH will provide one (1) hard copy and one (1) electronic copy.

MWH will prepare and distribute all meeting agendas prior to each meeting. MWH will also prepare and distribute all meeting minutes within two days after each meeting.

All meetings will be held at the City offices.

Deliverables: Deliverables for Task 1 include:

1. *Meeting agendas*
2. *Meeting minutes (upon demand)*
3. *Project schedule updates*

Task 2 – Basis of Design Report

Task 2.1 – Basis of Design Report (BODR): MWH will prepare a single Basis of Design Report (BODR) which evaluates cost-benefit alternatives for replacement of the existing Peck Reservoir. The BODR will include a detailed study of the Distribution system including water demand, water quality, operational requirements, and system storage needs. The result of the BODR will be to identify a practical and cost-effective reservoir replacement to be carried to final design phase. MWH will confirm BODR findings with City staff and define the proposed project improvements and system operation. The BODR will also determine operational storage for water system supply/demand and water age criteria.

MWH will analyze system storage requirements for typical operational storage, emergency storage, and fire suppression storage conditions, and determine the effect to the system for alternative reservoir capacity scenarios. MWH will determine a storage capacity that reflects a balanced approach to the system storage requirements. Reservoir storage capacity evaluations will take into account recommended operational storage at the site. Reservoir storage capacity of the site may be configured in order to provide flexibility of operations for varying water system needs.

Task 2.2 – Analyze City's Existing Water System Use: MWH will analyze the City's existing water system to determine appropriate design criteria for system water supply, water use, and water storage. The results of the analysis will be used in determination of the storage requirements.

Task 2.3 – Analyze System Storage Requirements and Effects: MWH will analyze system storage requirements for typical operational storage, emergency storage, and fire suppression storage conditions, and determine the effect to the system for alternative reservoir capacity scenarios. MWH will determine a storage capacity that reflects a balanced approach to the system storage requirements. Reservoir storage capacity evaluations will take into account recommended operational storage at the site. Reservoir storage capacity of the site may be configured in order to provide flexibility of operations for varying water system needs.

Task 2.4 – Confirm BODR's Findings with the City and Define Improvements: Based on the findings of the BODR, MWH will meet with the City during a workshop meeting and will present the recommended improvements and will assist the City to make decisions on the type and level of these improvements to the existing system.

Deliverables: Deliverables for Task 2 include:

1. *Five (5) hard copies of the BODR*
2. *One electronic copy of BODR in PDF format*
3. *One electronic copy of calculations*

Task 3 – Public Outreach Support

Task 3.1 – Community Outreach Meeting Presentations: MWH will assist the City during the project by attending meetings and making presentations. We anticipate attending up to five (5) community outreach meetings to be held in the evening time. The first community outreach meeting should be considered after MWH and City agree on the scope of the project and the critical project elements are determined. The subsequent community outreach meetings would be held during design development and when the plans are at 90% completion level.

Task 3.2 – City Council Meeting Presentations: MWH will attend up to three (3) City Council meetings and will assist the City in presenting the project and answer questions related to the improvements. The City Council presentation will occur during the 60% and 100% stages.

Task 3.3 – Presentation Materials: MWH will provide costs for attending, preparing materials, and presenting the project at public outreach and City Council meetings. For fee estimating purposes, we have included a fee for preparing the material which is limited to poster boards, building elevations, and other material. We have included an optional Task 20 for preparing additional renderings for public outreach and City Council meeting presentations.

Task 3.4 – Website and Hosting: MWH will work with City to setup a project website for the Peck Reservoir that will be linked with the City of Manhattan Beach website. Frequent postings will be placed into the website during the design phase of the project to inform the public of the project status and information sharing. MWH will host the website during the design phase of the project for a period from the start of the final design to completion of final design phase (9 months).

Deliverables: Deliverables for Task 3 include:

1. *Presentation handouts*
2. *Summary of meeting comments and outcomes*
3. *Prepare presentation drawings, renderings (optional task)*

Task 4 – Environmental Compliance and Permitting

Task 4.1 – Environmental Assessment to Comply with CEQA: MWH will conduct an environmental assessment for the project and prepare documentation, including Initial Study (IS) and public hearings as required to comply with the California Environmental Quality Act (CEQA). At this time, the City is uncertain as to what the appropriate environmental determination might be. Environmental determination will likely be a Mitigated Negative Declaration (MND). Our proposed fee does not include biological and cultural reports.

Task 4.2 – Permitting Documents: MWH will prepare documentation required to obtain permits from agencies having jurisdiction over this project. MWH will assist the City in filling out the applications required for these permits. The City will pay all permit fees.

Deliverables: Deliverables for Task 4 include:

1. *Notes, document logs, permit applications*

Task 5 – Background Research

Task 5.1 – Research Available Water System Records: MWH will research and obtain available water system records and studies, as-built plans, construction records, topographic survey, survey ties, City benchmarks, basis for bearings and

stationing, existing right-of-way, existing utilities, City standards, and improvements within and adjacent to the project area. MWH will maintain a log of all documents obtained for the project.

Task 5.2 – Field Investigations to Identify Field Conditions: MWH will conduct field investigation and site visits to identify existing facilities and site opportunities and constraints. MWH will visit the site to field verify the locations of the existing features, equipment, valves, etc. We anticipate two (2) site visits as a minimum to be required for this effort.

Deliverables: Deliverables for Task 5 include:

1. *Field notes, document logs, benchmarks and bearings (upon demand)*

Task 6 – Drinking Water Permit Amendment

Task 6.1 – Document Preparation: MWH will provide assistance to the City by preparing all documentation to apply for a California State Water Resources Control Board drinking water permit amendment, which is required if significant alterations are made to the existing water system. MWH will prepare the documentation for City review and submittal. The City will pay for all permit fees.

Deliverables: Deliverables for Task 6 include:

1. *Notes and application documents*

Task 7 – Water Quality

Task 7.1 – Review of City's 2010 Water Master Plan: For this task, MWH will review the City's 2010 Water Master Plan. The 2010 Water Master Plan will provide information for sizing of the Peck and Block 35 reservoirs.

MWH will incorporate the relevant data of those documents into the City's hydraulic model to design a new Peck Reservoir that will operate in conjunction with the planned Block 35 Reservoir to optimize a system wide disinfection residual which will assure compliance with the Stage 2 Disinfectant and Disinfection Byproduct Rule, Total Coliform Rule and Groundwater Rule.

Task 7.2 – Update City's Hydraulic Model: MWH will review the study titled "Disinfectant Residual Stability and Regulatory Compliance". MWH will incorporate the relevant data from these documents into the City's hydraulic model to design a new Peck Reservoir that will operate in conjunction with the planned Block 35 Reservoir to optimize a system wide disinfection residual which will assure compliance with the Stage 2 Disinfectant and Disinfection Byproduct Rule, Total Coliform Rule and Groundwater Rule.

Deliverables: Deliverables for Task 7 include:

1. *Updated hydraulic model and results*

Task 8 – Water Blending

Task 8.1 – Optimization of Blending Process: The City's groundwater wells contain manganese at levels that exceed the Title 22 Maximum Contaminant Level Secondary Standards (MCL). Groundwater is currently blended at Peck Reservoir with imported water from the Metropolitan Water District of Southern California to reduce the manganese concentration of the finished water below the MCL. MWH will propose a design that will optimize the water blending process and will recommended action may include restrictions to well production in order to meet MCL standards. MWH will consider a footprint on the existing Peck Ground

Level Reservoir site to be taken into consideration during the design of the Peck Reservoir replacement for construction of the future Iron/Manganese Treatment System.

Task 9 – Water System Operations Plan During Construction

Task 9.1 – Analyze/Update Operations Plan: When Peck Reservoir is in construction and therefore unavailable to the system, alternative water system operations will be necessary to supply water during peak demands. MWH will analyze the water system supply and demand in order to determine required system operation during reservoir construction. Analysis will include various operational scenarios including maximum day demand and maximum day demand plus fire flow. MWH will determine the capability of the water system to provide water supply and demand pressure without the availability of Peck Reservoir. MWH will also plan the construction of the new reservoir such that the reservoir will not be taken out of service for more than one summer where the demands are high.

Task 10 – Utility Coordination

Task 10.1 – Utility Research: MWH will prepare and mail preliminary utility notices on City letterhead at the beginning of the project to obtain utility maps and other documents to identify existing utility locations on the plans. MWH will coordinate with affected utility companies to depict any necessary utility modifications. MWH will also prepare and mail final utility notices in the same manner upon completion of the draft 100% plans. It may be assumed that the detailed design for new or relocated utilities will be prepared by the utilities, and construction of the same will be the responsibility of the affected utility. The City will provide contact information for affected utilities if available.

Deliverables: Deliverables for Task 10 include:

1. *Utility notices*
2. *Utility maps and documents (upon demand)*

Task 11 – Geotechnical Engineering Services

Task 11.1 – Geotechnical Engineering Report: MWH's subconsultant, Fugro Consultants, will prepare a geotechnical report for this project. The geotechnical scope of work will include field borings, laboratory testing, and a detailed design report. The geotechnical services on this project include but are not limited to:

- Preliminary evaluations to assist in site analysis and to define the bearing capacities for proposed locations
- Studies for ground modification/improvement/stabilization to facilitate construction or reduce costs
- Detailed analysis to determine site seismic class
- Evaluations for excavation shoring, support and underpinning, if needed
- Assessment of corrosive effects of soils on facility elements
- Studies to evaluate excessive settlement due to subsoil conditions

We propose a subsurface exploration program for the planned reservoir improvements that will consist of drilling and logging 4 hollow-stem-auger drill holes. The proposed explorations will be performed using a standard truck-mounted drilling rig and will be drilled in areas accessible from the surrounding streets and walkways. We note that we will not be able to drive equipment up the reservoir side slopes through the access gates mentioned above to perform subsurface exploration. The drill holes are anticipated to extend to depths of between 60 and 80 feet below the existing ground surface or to about Elevation 15 feet.

Deliverables: Deliverables for Task 11 include:

1. *Geotechnical study report*

Task 12 – Surveying and Existing Site Conditions

Task 12.1 – Topographic and Land Survey: MWH's subconsultant, The Prizm Group, will provide all topographic and land surveying services to identify all features, objects and critical control points required to prepare the construction plans and other documents for this Project. The surveying work will include sufficient adjacent areas as needed to join or match existing conditions.

Deliverables: Deliverables for Task 12 include:

1. *Field and topographic survey plans*

Task 13 – Draft Construction Plans and Specifications

After approval of the Basis of Design Report (BODR), MWH will begin preparing the plans and specifications for the selected improvements for bidding by the City. MWH will use City CAD standards (provided by the City). MWH will prepare all technical specifications required for the project. The bidding documents (front-end specifications) will be provided by the City. MWH will prepare the Bid List and Bid Descriptions. We estimate a total of approximately 97 drawings will be required for the improvements which will be mainly structural, architectural, civil/piping, mechanical, electrical, and instrumentation. Table 1-1 in the following pages is a preliminary list of the anticipated drawings for this project.

Task 13.1 – 30% Plans and Specifications: MWH will submit a 30% design review package upon completion of the BODR. The plans and specifications will reflect all past City input in the BODR. As a minimum, the 30% design submittal shall consist of the following:

- Design drawings and a draft of the technical sections of the specifications
- Calculations
- Catalog sheets
- Operation and control philosophy
- Design conditions/criteria
- City design details
- Utility research

Task 13.2 – 60% Plans and Specifications:

Upon receiving the 30% review comments from the City, MWH will continue the work to prepare the 60% plans and specifications for the recommended project. The 60% plans deliverables will include the following items:

- Design drawings (General, Civil, Structural, Mechanical, Electrical, Instrumentation, Architectural, and Landscaping plans)
- Project specifications (technical sections)
- Calculations (all disciplines)

Task 13.3 – 90% Plans and Specifications: The 90% design shall be a complete set of checked plans and specifications. The plans and specifications shall be fully checked and be ready to 100% completion level. They shall reflect all past City input and they shall include the contractual language and designs required to implement the controlling agency permit requirements during construction. The 90% package shall be as complete as 100% and shall include the entire project details.

Task 13.4 – 100% Plans and Specifications:

Upon receiving the 90% review comments from the City, MWH will complete the design of the project and will submit a 100% level draft set of plans and specifications for a final review by the City prior to bidding of the project.

Deliverables: Deliverables for Task 13 include:

1. *Ten (10) hard copies of half size plans at each submittal level*
2. *Ten (10) hard copies of the specifications at 60, 90, and 100% level submittals*
3. *One (1) electronic copy of all deliverables in PDF format*
4. *One (1) electronic copy of all deliverables in original format (AutoCAD, MS Word, Excel, etc.)*

Task 14 – Final Construction Bidding Documents Including Plans and Specifications

Task 14.1 – Final 100% Plans and Specifications Package: Upon review and submittal of final corrections by the City, the MWH will prepare a final PS&E package, including full size plans on mylar with engineer's signatures and stamps. Project specifications will be signed and stamped by the engineer of record.

Deliverables: Deliverables for Task 14 include:

1. *One (1) signed and stamped copy of the plans (mylar, full size)*
2. *One (1) hard copy of the specifications signed and stamped*
3. *One (1) electronic copy of all deliverables in PDF format (plans and specifications)*
4. *One (1) electronic copy of all deliverables in original format (AutoCAD, MS Word 2010, Excel, etc.)*

Task 15 – Construction Cost Estimate

Task 15.1 – Construction Cost Estimate Prior to 100% Final Design: MWH will prepare an itemized construction cost estimate in MS Excel format pursuant to the 100% and final design. The estimates will include a breakdown for each element of the work, with separate line items categorized by similar work components and summarized for the entire project. Construction cost estimate line items will correspond to the project's bid items in the project Specifications.

Deliverables: Deliverables for Task 15 include:

1. *One (1) hard copy of the 100% cost estimate*
2. *One (1) electronic copy of the 100% cost estimate in Excel format*

Task 16 – Design Schedule and Estimated Construction Schedule

Task 16.1 – Prepare and Maintain a Detailed Design Schedule: MWH will prepare a detailed design CPM schedule based on project tasks and will include Milestone Dates for project deliverables. MWH will update the Design Schedule based on the actual project progress.

Task 16.2 – Prepare and Maintain a Detailed Construction Schedule: MWH will prepare a detailed construction schedule during the final design phase of the project. MWH will update the Construction Schedule based on the actual project progress. MWH will coordinate with the City, the anticipated construction durations.

Deliverables: Deliverables for Task 16 include:

1. *One (1) hard copy of the design CPM schedule*
2. *One (1) hard copy of the estimated construction schedule*
3. *One (1) electronic copy of the design CPM schedule and estimated construction schedule*

Task 17 – As Built Plans

Task 17.1 – Prepare As Built Plans: MWH will provide As-Built plans that describe the final constructed project pursuant to modifications made at the time of construction. Red-line mark-ups of Final Construction Plans will be provided by the City from the Construction Manager/Inspection Consultant to MWH. The As-Built plans will also include modifications to the original plans due to responses to RFIs.

Deliverables: Deliverables for Task 17 include:

1. *One (1) hard copy of the as built plans (mylar)*
2. *One (1) electronic copy of the as built plans in AutoCAD format*
3. *One (1) electronic copy of the as built plans in PDF format*

Task 18 – Construction Assistance

Task 18.1 – Review and Respond to Submittals: MWH will review submittals and shop drawings submitted by the contractor and will ensure all submittals meet the requirements of the final plans and specifications. We have estimated a total of fifty (50) submittals and resubmittals for fee estimating purposes. MWH will maintain a log for submittals with the received/responded dates.

Task 18.2 – Review and Respond to RFIs: MWH will provide written responses to contractor's questions. All RFIs will be responded in writing. We have estimated a total of thirty (30) RFIs will be responded for fee estimation purposes. MWH will maintain a log for RFIs with the received/responded dates.

Deliverables: Deliverables for Task 18 include:

1. *Written response to RFIs*
2. *Cut sheet approvals*

Table 1-1 Preliminary List of Drawings

SHEET No.	Drawing Title	Total No. of Drawings
	GENERAL	**8**
G-1	TITLE SHEET	1
G-2	LOCATION AND VICINITY MAPS AND DRAWING INDEX	1
G-3	GENERAL NOTES, SYMBOLS AND ABBREVIATION	1
G-4	SURVEY CONTROL	1
G-5	OVERALL PROJECT SITE PLAN	1
G-6	OVERALL DEMOLITION PLAN	1
G-7	TEMPORARY SHORING PLAN	1
G-8	HYDRAULIC PROFILE	1
	CIVIL	**22**
GC-1	STANDARD CIVIL GENERAL NOTES AND DETAILS - 1	1
GC-2	STANDARD CIVIL DETAILS - 2	1
GC-3	STANDARD CIVIL DETAILS - 3	1
GC-4	STANDARD CIVIL DETAILS - 4	1
GC-5	MISCELLANEOUS DETAILS-1	1

SHEET No.	Drawing Title	Total No. of Drawings
GC-6	MISCELLANEOUS DETAILS-2	1
C-1	OVERALL SITE PLAN	1
C-2	DEMOLITION PLAN-1	1
C-3	DEMOLITION PLAN-2	1
C-4	GRADING AND PAVING PLAN – 1	1
C-5	GRADING AND PAVING PLAN - 2	1
C-6	YARD PIPING PLAN-1	1
C-7	YARD PIPING PLAN-2	1
C-8	YARD PIPING PROFILES-1	1
C-9	YARD PIPING PROFILES-2	1
C-10	SITE SECTIONS-1	1
C-11	SITE SECTIONS-2	1
C-12	RESERVOIR UNDERDRAIN PLAN AND DETAILS	1
C-13	WALL PROFILE-1	1
C-14	WALL PROFILE-2	1
C-15	INLET CONTROL VALVES VAULT PLAN AND SECTIONS	1
C-16	BYPASS AUTOMATIC CONTROL VALVE VAULT PLAN AND SECTIONS	1
	STRUCTURAL	**25**
GS-1	STRUCTURAL GENERAL NOTES AND STANDARD DETAILS - 1	1
GS-2	STRUCTURAL STANDARD DETAILS - 2	1
GS-3	STRUCTURAL STANDARD DETAILS - 3	1
GS-4	STRUCTURAL STANDARD DETAILS - 4	1
GS-5	STRUCTURAL STANDARD DETAILS - 5	1
GS-6	STRUCTURAL STANDARD DETAILS - 6	1
S-1	RRESERVOIR OVERALL FOUNDATION PLAN	1
S-2	RESERVOIR FOUNDATION PLAN-1	1
S-3	RESERVOIR FOUNDATION PLAN-2	1
S-4	RESERVOIR ROOF PLAN-1	1
S-5	RESERVOIR ROOF PLAN-2	1
S-6	RESERVOIR SECTIONS	1
S-7	RESERVOIR WALL SECTION AND INTERIOR COLUMN ELEVATION	1
S-8	RESERVOIR OVERFLOW PLAN AND SECTION	1
S-9	RESEVOIR DRAIN SUMP PLAN, SECTIONS, AND DETAILS	1
S-10	RESERVOIR ACCESS STAIR PLAN AND SECTION	1
S-11	RESERVOIR INLET/OUTLET PIPE PLAN AND SECTIONS	1
S-12	PUMP STATION FOUNDATION AND FLOOR PLAN	1
S-13	PUMP STATION ROOF PLAN	1

SHEET No.	Drawing Title	Total No. of Drawings
S-14	PUMP STATION SECTIONS AND DETAILS	1
S-15	ELECTRICAL BUILDING AND OFFICE FLOOR PLAN	1
S-16	ELECTRICAL BUILDING AND OFFICE ROOF PLAN	1
S-17	ELECTRICAL BUILDING AND OFFICE SECTIONS	1
S-18	MISCELLANEOUS DETAILS-1	1
S-19	MISCELLANEOUS DETAILS-1	1
	ARCHITECTURAL	**4**
A-1	PUMP STATION FLOOR PLAN	1
A-2	PUMP STATION EXTERIOR ELEVATIONS	1
A-3	SCHEDULES AND DETAILS	1
A-4	DETAILS	1
	MECHANICAL	**12**
GM-1	MECHANICAL GENERAL NOTES AND STANDARD DETAILS - 1	1
GM-2	MECHANICAL STANDARD DETAILS - 2	1
GM-3	MECHANICAL STANDARD DETAILS - 3	1
GM-4	MECHANICAL STANDARD DETAILS - 4	1
M-1	FLOW DIAGRAM	1
M-2	PUMP STATION PLAN	1
M-3	PUMP STATION SECTIONS	1
M-4	PUMP STATION DETAILS-1	1
M-5	PUMP STATION DETAILS-2	1
M-6	DISINFECTION EQUIPMENT PLAN AND SECTION	1
M-7	PUMP STATION VENTILATION PLAN, SECTION AND DETAILS	1
M-8	RESERVOIR VENTILATION PLAN SECTION AND DETAILS	1
	ELECTRICAL	**15**
GE-1	GENERAL ELECTRICAL NOTES, LEGEND, AND ABBREVIATIONS	1
GE-2	ELECTRICAL STANDARD DETAILS - 1	1
GE-3	ELECTRICAL STANDARD DETAILS - 2	1
GE-4	ELECTRICAL STANDARD DETAILS - 3	1
GE-5	ELECTRICAL STANDARD DETAILS - 4	1
GE-6	SCHEDULES	1
E-1	ELECTRICAL OVERALL SITE PLAN	1
E-2	ELECTRICAL SINGLE LINE DIAGRAMS	1
E-3	PUMP STATION AND OFFICE ELECTRICAL PLANS	1
E-4	PUMP STATION ELECTRICAL LIGHTING AND POWER PLANS	1
E-5	DISINFECTION FACILITIES POWER PLAN	1
E-6	GENERATOR PLAN, SECTION AND DETAILS	1

SHEET No.	Drawing Title	Total No. of Drawings
E-7	INLET CONTROL VALVES VAULT ELECTRICAL PLAN AND SECTIONS	1
E-8	BYPASS AUTOMATIC CONTROL VALVE VAULT PLAN AND SECTIONS	1
E-9	SCHEMIATICS	1
	INSTRUMENTATION	**5**
GI-1	INSTRUMENTATION SYMBOLS, LEGEND, AND GENERAL NOTES	1
GI-2	INSTRUMENTATION STANDARD DETAILS - 1	1
I-1	PROCESS AND INSTRUMENTATION DIAGRAMS - 1	1
I-2	PROCESS AND INSTRUMENTATION DIAGRAMS - 2	1
I-3	PROCESS AND INSTRUMENTATION DIAGRAMS - 3	1
	LANDSCAPING	**6**
L-1	IRRIGATION PLAN	1
L-2	IRRIGATION LEGEND AND NOTES	1
L-3	IRRIGATION DETAILS	1
L-4	PLANTING PLAN	1
L-5	PLANTING LEGEND AND NOTES	1
L-6	LANDSCAPE SPECIFICATIONS	1
	Total Number of Drawings	**97**

Additional Optional Tasks

In addition to the scope of services requested in the RFP, MWH recommends the following additional optional tasks in case it becomes necessary in the future. MWH will not proceed with the work on the optional tasks unless written notice to proceed is given by the City to perform the work. The following is a list of additional optional scope or work:

Task 19 – Construction Meetings

Task 19.1 – Construction Meetings: Upon request by the City, MWH will attend two additional meeting:

- One (1) prebid meeting during the bid phase
- One (1) pre construction meeting prior to start of construction

Attending monthly construction meetings is not included in this task. MWH will provide a separate proposal to attend regular monthly meetings during construction if requested by the City.

Task 20 – Presentation Renderings

Task 20.1 – Presentation Renderings: MWH will prepare public presentation renderings for the public and City Council meetings if needed. We have included a total of five (5) renderings as an optional task. Other presentation materials such as plans and drawings are included under Task 3.

Task 21 – Computational Fluid Dynamic Modelling (CFD)

Task 21.1 – Prepare CFD model: In order to ensure proper water circulation and avoiding the dead zones within the reservoir and to improve water quality, MWH recommends a CFD model to be prepared for the proposed reservoir. We have successfully prepared the CFD models for our previous similar projects and have obtained successful results.

Task 22 – Well Water Quality Analysis

Task 22.1 Additional Water Quality Analysis: MWH will investigate all the available water quality data related to well 11A and well 15. Of a particular interest would be recent measurements for manganese, TOC and ammonia, and variability of these parameters since 2014. Wells 11A and 15 (Tasks 2.1 and 2.2, respectively) will be sampled for general water quality which will include iron, manganese, ammonia, TOC, HPCs and total coliform. Additionally, well 11A will be tested for disinfection byproducts (DBPs) formation potential for several scenarios, governed by the measured concentration of ammonia in the water. Historical ammonia concentrations for well 11A (approx. 1.4 mg/L) indicated that formation of chloramines with natural ammonia is not a viable option at the wellhead. DBPs bench testing will be performed for breakpoint chlorination at wellhead as well as various blends with MWD water using natural ammonia. Should the ammonia concentration in well 15 exceed the previous measured values (0.6 mg/L), DBPs bench testing will be also performed for this well. Otherwise, results from the testing perform by Hazen in December 2014 will be used for the analysis.

The results from water quality samples and the bench testing performed under Task 2 (Basis of Design Report) will be tabulated in Excel file and analyzed for further recommendations. Comparison with historical data will also be performed in this task.

Recommendations for addressing the water quality issues identified in Task 2 (Basis of Design Report) will be presented in a technical memorandum which can be integrated into the BODR. Recommendations will include wellhead treatment for the two wells, optimizing the ranges of blending ratio with MWD water, and improvements to the disinfection strategy.

Deliverables: Deliverables for Task 23 include:

1. *Draft Technical Memorandum*
2. *Final Technical Memorandum*

Task 23 – Future Manganese Treatment

Task 23.1 Evaluation of Future Manganese Treatment into BODR: MWH will investigate the potential for providing space for Manganese treatment for the groundwater wells. The process system will potentially use “Green Sand Filter” system for removal of Manganese. MWH will incorporate a preliminary layout of this treatment system into the BODR.

Task 23.2 Implement Future Manganese Treatment into Final Design: If the City decides to include Manganese treatment into the final design, MWH will prepare additional plans and specifications for this process. MWH incorporate the treatment system as part of the construction documents and will include the cost of this facility into the overall construction cost estimate.

Task 24 – Potential Community Improvements

Task 24.1 – Evaluation of Community Improvements in BODR: MWH will evaluate and include the potential community improvements requested either above the reservoir roof or adjacent to the reservoir within the project site. These improvements may include playing field facilities, gym, solar panels, restrooms, or others. The BODR will evaluate the options as recommended during the public meetings and will recommend the option that best meets the public needs and the City. The City will then decide to include the recommended option in the Final Design. Optional Task 24.2 below describes the Scope of Work that may be included in the Final Design.

Task 24.2 – Modifications to Final Design to Implement Community Improvements: MWH will incorporate the design of the facilities recommended by the City and Public. For this task, MWH will prepare additional construction plans and specifications

for the recommended facilities. This work may include additional Civil, Structural, Mechanical, Architectural, and Landscaping design.

Task 24.3 – Additional Project Management to Implement Community Improvements: For this task, MWH will provide additional management activities required for the implementation of the community improvements in the Final Design. MWH will attend up to six (6) coordination meetings with the City to discuss the proposed improvements.

Task 24.4 – Additional Public Outreach to Implement Community Improvements: MWH will attend additional public meetings related to the public community improvements as required to present the recommended improvements. MWH will prepare presentation material and renderings for these meetings. MWH will prepare up to three (3) renderings for this task.

3.0 Project Management

MWH believes that frequent, open communication is critical to the success of any project. The MWH team is committed to delivering this project while meeting the City's objectives for quality, cost, and schedule. Our project management approach consists of a collaborative process with the City to provide timely and informed decision making throughout the project. MWH will apply our project-proven standard tools for quality control, cost control, schedule control, and document management to assist in anticipating issues and pro-actively resolving potential issues.

MWH's project management philosophy is to provide the right person for the right job. We staff each project with an experienced project manager, experienced architects, engineers and scientists who are career professionals, and subject matter experts that provide critical expertise. Our project management procedures and approach to project delivery is to be responsive to our clients' needs and to work proactively in partnership with the client's project manager to advance the project. We have found this proactive project management approach to be successful in maintaining the project schedule, operating within the project budget, and delivering quality work products. This approach is buttressed by accountability. All work tasks have assigned accountable parties who ensure that work is completed according to our standardized tools.

MWH's project management procedures include a strong emphasis on project controls and consistent practices. MWH recognizes that project controls are critical to the successful delivery of any project. The MWH Project Manager will work together with City's Project Manager to implement reporting procedures in compliance with this Request for Proposal to communicate and track the progress of the work in terms of schedule and budget.

MWH's suggested procedure for out-of-scope work is to coordinate with City's Project Manager to identify tasks with requirements not originally included in the scope of work. MWH's and the City's Project Managers will also coordinate the scope definition and budget associated with the out-of-scope tasks, followed by a submittal by MWH with a Change Order Request Form and Change Order Log.

Finally, MWH stresses continuous professional improvement. Our project managers, engineers, and scientists regularly receive additional training to grow their knowledge and experience.

3.1 Quality Control/Quality Assurance

MWH is highly experienced in the planning and design of reservoirs. Our Project Manager, Miko Aivazian, and Project Engineer, Matthew Huckaby, have served as the project team on many similar projects.

MWH will develop a Quality Management Plan (QMP) and submit to the City prior to starting the work. The QMP will detail all of the quality goals, who will be conducting MWH's internal goals, checklists for the feasibility study, and a schedule of activities to be performed. This will allow MWH and the City staff to anticipate when deliverables will be submitted so that other tasks can be put to the side and the critical tasks of reviewing the upcoming submittal can take place in a timely manner.

4.0 Firm Qualifications and Experience

4.1 Company Overview

MWH is a full-service consultant, engineer, and constructor that possesses the global perspective and experience, local knowledge, breadth, and depth of resources to deliver this project in an efficient and effective manner for the City. Over the decades, MWH has expanded our core competencies from water and wastewater into a wide range of environmental and business services – from mining, engineering, power, and industrial treatment to solid waste management, air quality control, and soil reclamation, all of which complement and build on the high level of technical expertise within the organization.

MWH has long been considered one of the world's leading experts on water and wastewater project management, design, and construction. We have consistently been ranked in the *Engineering News-Record (ENR)* as an industry leader in these fields. MWH is also repeatedly featured in *Forbes'* Magazines "Top 500 Privately Held Companies" list, and have been the recipient of numerous industry awards for design excellence and environmental awareness.

MWH is an employee-owned company, headquartered in Broomfield, Colorado and has 170 offices worldwide. With approximately 7,000 specialists in 35 countries and annual revenues in excess $1.3B, MWH maintains a distinctively high level of expertise in water, wastewater, energy, and infrastructure and is a proven leader in delivering water, water reclamation, and wastewater design and construction services. We have engineered, constructed, financed, and managed many of the largest and most technologically significant infrastructure projects in the world.

Our Southern California roots are deep, with more than 60 years of experience and 450 professionals located within our six offices, demonstrating our focus and dedication to the region. MWH has provided various engineering services to some of the largest utility companies throughout the region.

MWH has been challenged with projects located in dense urban areas with severe right-of-way constraints, high socioeconomic impacts, and strongly competing values for acceptable integration of reservoir and pumping station projects with the natural and built environment. On many of these projects, MWH developed innovative methodologies to enhance engineering analysis, resulting in a greater understanding of water storage and delivery issues that, in turn, produced cost-effective solutions such as selection of the most feasible reservoir type and blending in with neighborhoods. Our team understands the delicate balance of engineering and environmental impacts of projects in these sensitive areas.

Hazen and Sawyer was founded in 1951 by Richard Hazen, who is the son of Allen Hazen, the founder of the Hazen and Williams hydraulic equations and tables. Hazen and Sawyer has recently updated the company name to Hazen. Hazen's roots began in New York by developing the water infrastructure in the State and New York City in particular. Hazen has expanded in the Atlantic Seaboard, Midwest and now the West Coast. Hazen has been in Southern California since 2010 and has expanded to 7 offices in the western portion of country.

Hazen brings a deep knowledge and experience in water treatment, water quality, water conveyance, storage and water related engineering projects. Hazen has helped a wide range of clients deliver billions of gallons of high-quality drinking water to their customers, assessing water distribution systems, designing repairs and new infrastructure. Study scopes have ranged from relatively simple one-source water systems, to multiple-source, multiple-pressure zone systems with reservoirs, tanks, wells, pumping stations and interconnections to adjacent communities.

Hazen's engineers are experts in using state-of-the-art computer-aided hydraulic analysis tools, a wide range of pipeline materials and efficient technologies to create robust, reliable distribution systems, and by adding System Controls and Data Acquisition technology to your system, we can optimize power consumption and demand charges, improve system reliability, and provide greater operating flexibility.

4.2 Qualifications and Experience

MWH is an industry leader in designing and building water storage and conveyance facilities in Southern California. The MWH Team members each have experience in designing seismic upgrades to reservoirs similar to the proposed 1.6 MG Reservoir. Our Project Manager Miko Aivazian and other team members have designed concrete reservoirs ranging from 1.0 MG up to 100 MG capacity. Their experience will benefit the City in planning the best options for your project. MWH's relevant experience has helped water agencies build and maintain reliable storage and supply that meets or exceeds industry standards. Our knowledge and experience gained on prior projects will benefit the City by saving costs and by using a design approach to be sensitive to public preferences.

16.0 MG Evans Reservoir Construction

MWH was founded in Southern California in 1945 and has designed and managed the construction of concrete reservoirs as far back as 1960. Reservoir design has evolved and MWH has worked closely with manufacturers, American Concrete Institute (ACI), and the American Water Works Association (AWWA) to define and establish water reservoir standards. MWH has the experience designing cast-in-place and pre-stressed reservoirs in all types of soil conditions and has the ability to perform or review the advanced structural analysis of all concrete reservoir types. MWH has worked closely with owners and manufacturers to design "bottle-tight" reservoirs to last over 100 years.

16.0 MG Evans Reservoir Construction

Our project team will leverage their previous experience and accomplishments, which include:

- *Pre-design and design for more than 230 concrete reservoir projects varying in capacity from 20,000 gallons to 100 million gallons (MG).*
- *Design of the largest buried reinforced concrete reservoir in the northwestern United States; the 100 MG Jordan Terminal Aqueduct Reservoir serving the Central Utah Water Conservancy District in Salt Lake City, Utah.*
- *Design of more than 35 pre-stressed concrete reservoirs including the 32 MG Eastside Reservoir in Seattle, which at the time was the largest water reservoir of this type in the United States.*
- *Close participation on technical committees and are voting members of the following committees:*

  ACI 350 – Environmental Engineering concrete structures
  ACI 350-D Structural subcommittee
  ACI 350-E Precast/Pre-stressed subcommittee
  ACI 350-F Seismic provisions subcommittee
  ASCE SEI 41 – Standards committee on seismic rehabilitation

The City will benefit from a team that has designed concrete reservoirs that can be competitively bid to achieve the lowest construction cost.

4.3 Relevant Project Experience

The projects listed in Table 4-1 on the following page details only a small sample of MWH's extensive reservoir design and rehabilitation experience.

MWH has been challenged with projects located in dense urban areas with severe right-of-way constraints, high socioeconomic impacts, and strongly competing values for acceptable integration of pumping station projects with the natural and built environment. On many of these projects, MWH developed innovative methodologies to enhance engineering analysis, resulting in a greater understanding of water storage and delivery issues that, in turn, produced cost-effective solutions. Our team understands the delicate balance of proper engineering, local site impacts, and costs of projects in these sensitive areas.

In addition to the challenges presented above, projects in California present an additional challenge – the need to design seismically sound structures. MWH has performed numerous seismic evaluations and has provided designs for both new structures and retrofits of existing structures throughout California, designed to be seismically sound.

TABLE 4-1 MWH's Project Experience

Reservoir Project	Client	Capacity (MG)	Circular / Rectangular
Reservoirs No. 1 and 2	South Montebello Irrigation District, City of Montebello, CA	0.75 (each)	Circular
Sun Lakes Reservoir	City of Banning, CA	1.5	Circular
John Garthe Reservoirs (two)	City of Santa Ana, CA	2.3 (each)	Circular
Foothill Ranch Water Facilities Improvement Project	City of Corona, CA	3	Rectangular
Tank No. 5	Central Coast Water Authority	3	Circular
University City Reservoir	City of Riverside, CA	3	Circular
Vinnell Reservoir	Southern California Water Company	3.5	Circular
E-2 Reservoir	Vista Irrigation District	3.8	Rectangular
Reservoir No. 10-B	City of Pomona, CA	5	Circular
St. Joseph Reservoir No. 1	City of Arcadia, CA	5	Rectangular
Fountain Valley Reservoir No. 1	City of Fountain Valley, CA	5	Circular
Zone 5 Reservoir	City of Corona, CA	5	Circular
Zone 6 and Zone 6A Reservoirs	Irvine Ranch Water District (CA)	5 & 2	Circular
Reservoirs No. 12-A and 13-A	City of Upland, CA	5 & 5.5	Circular
Los Carneros Reservoir	Goleta Water District (CA)	6.4	Circular
Reservoir No. 5 Montclair	City of Chino, (CA)	7	Circular
Van Buren Reservoir	City of Riverside, CA	7.5	Rectangular
Two Replacement Reservoirs and Booster Pumping Station	City of Westminster, CA	8 (each)	Circular
Civic Center Reservoir	City of Vernon, CA	10	Rectangular
Highland Avenue Reservoir	City of Redlands, CA	10	Rectangular
Perris Hill Reservoir	City of San Bernardino, CA	10	Circular
Reservoir No. 5B	City of Pomona, CA	10	Circular
Tilden Reservoir	City of Riverside, CA	10	Rectangular
Walteria Reservoir	City of Torrance, CA	10	Rectangular

4.4 Project Team

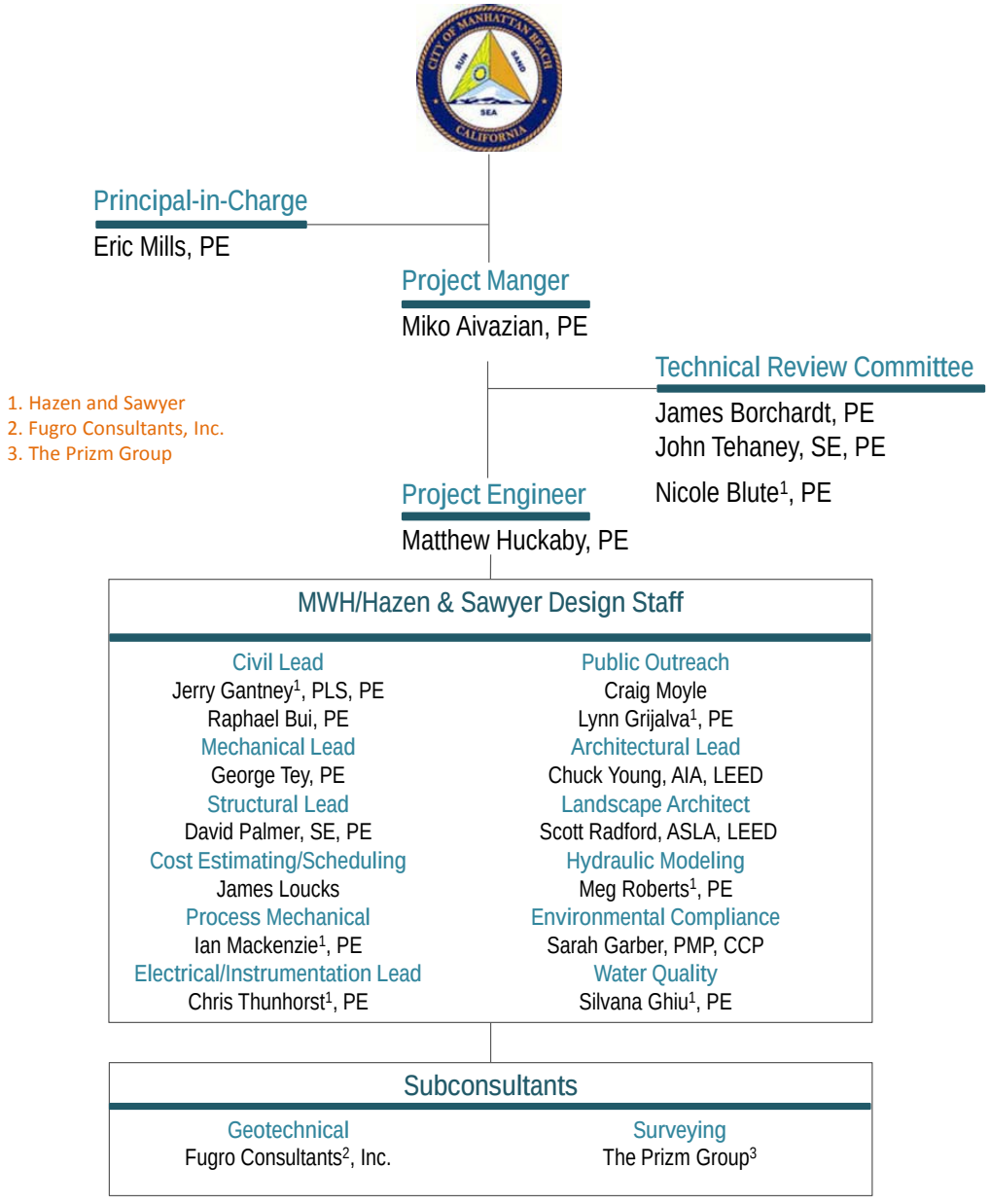
We have assembled a team with extensive experience on the design and construction of concrete reservoirs (buried and above ground), Our Project Manager, Miko Aivazian and Project Engineer, Matthew Huckaby recently completed the 16 MG Evans Reservoir Replacement Project and the 16 MG Linden Reservoir seismic upgrades and roof replacement Project for City of Riverside Public Utilities. The Evans Reservoir included demolition of the existing reservoir and replacing it with a new reservoir.

The Linden Reservoir included preliminary evaluations, seismic analysis, life cycle analysis, and rehabilitation of several reservoir appurtenances including structural components and piping.

Below is a list of our team experiences in performing similar work. MWH recommends the City to contact our team references for our past performance records on similar projects.

The MWH team has the right combination of skills and experience to exceed the City's expectations. Our Project Manager, Miko Aivazian brings 28 years of relevant experience to the City, most recently demonstrated in the successful design and construction management of the 16 MG Linden Reservoir Rehabilitation Project. Miko and Matt will be responsible for managing and design of the reservoir. Raphael Bui will be responsible for civil and pipeline design. Miko, Matt, and Raphael have worked together on several similar reservoir projects.

The organization chart below shows the project team and their reporting relationships. On the following pages are brief introductions to the key team members. Full resumes of all project staff are provided in Appendix A.



4.5 Key Project Staff

Our key managerial and technical staff proposed for this project will be available to the City for the duration of the project assign and are committed to investing the appropriate amount of time to deliver a successful project to the City of Manhattan Beach.

Miko Aivazian will serve as Project Manager and primary point of contact for the City. He will provide project updates/status reports on a regular basis and will also be available to address questions as needed for the duration of the contract.

Miko Aivazian, MS, PE – Project Manager

MS/Civil/Environmental Engineering/1997/Loyola Marymount University
BS/Civil Engineering/1984/University of Houston
Professional Civil Engineer/CA/C053036

Miko Aivazian has more than 28 years of experience related to water, wastewater, and storm water, recycled water, distribution and storage, pumping stations; high and low pressure piping systems, and reservoirs. Miko has an outstanding track record of successful project management and engineering in water and wastewater projects. He is experienced in managing large design teams and keeping the lines of communications open to achieve a complete and on time project within budget. Miko has extensive experience in design, seismic upgrade, and construction of concrete reservoirs.

- *16 MG Linden Reservoir Seismic Rehabilitation Project, Riverside, CA*
- *16 MG Evans Reservoir Replacement Project, Riverside, CA*
- *15 MG Chevy Chase 968 Reservoir and Pump Station Replacement Project, Glendale, CA*
- *55 MG Elysian Reservoir Replacement Project, Los Angeles, CA*
- *5 MG St. Joseph Reservoir No. 1 Replacement Project, Arcadia, CA*
- *1.2 MG Pre-stressed Sun Lakes Reservoir, Banning, CA*
- *1.25 MG Wilson Reservoir and Pump Station, South Pasadena, CA*
- *Tilden Reservoir (10MG), Riverside, CA*
- *Van Buren Reservoir (7.5 MG), Riverside, CA*
- *80 MG Headworks Reservoir, City of Los Angeles, LADWP*
- *2-30 MG Toyon Pre-stressed Tanks, City of Los Angeles, LADWP*

Matthew Huckaby, PE – Project Engineer

BS/Civil Engineering/2005/University of Louisiana at Lafayette
Professional Civil Engineer/CA/C76961

Mr. Huckaby has extensive background in structural and civil design, with particular emphasis on structural and seismic design of liquid containing and underground structures, hydrologic and hydraulic design, storm water mitigation, site layout and horizontal control, and preparation of design plans, reports and specifications. He has practiced as a project engineer and structural engineer of record for multiple projects. His project experience includes design of pump stations, reservoirs (concrete and steel), water and wastewater treatment plants, junction and diversion structures, manholes, catch basins and pipelines, encompassing stormwater, wastewater, recycled water and potable water. In addition, he has involvement with reservoir rehabilitation, and pipeline assessment.

- *16.0 MG Linden Reservoir Seismic Rehabilitation Project, Riverside, CA*
- *16.0 MG Evans Reservoir Replacement Project, Riverside, CA*

- *55.0 MG Elysian Reservoir Replacement Project, Los Angeles, CA*
- *15.0 MG Chevy Chase 968 Reservoir and Pump Station, Glendale, CA*
- *2.0 MG Benton Recycled Water Tank, Eastern Municipal Water District. Perris, CA*
- *Tuscany Hills Recycled Water Tank and Pipeline, Lake Elsinore, CA*

James Borchardt, PE – Principal-In-Charge

Professional Civil Engineer/CA/35819
Professional Civil Engineer/NV/021603
Professional Civil Engineer/CO/17847MS, Environmental Engineering, University of North Carolina at Chapel Hill
BS, Civil Engineering, Colorado State University

Mr. Borchardt has more than 37 years of experience in project management and engineering for large treatment, conveyance, and storage facilities. He has managed more than 100 projects with total construction value of over $2.0B. In addition to managing projects, Mr. Borchardt serves as MWH Water Technology Director with expertise in water quality studies, facility planning and design, process evaluation, site development, hydraulic analysis, design, construction management, startup, and operation of water facilities. Mr. Borchardt has served as Technical Director and/or Quality Control Engineer on more than 200 conveyance, storage, supply and treatment facilities throughout the United States, Asia, and Europe.

John Tehaney, PE, SE – QA/QC (Structural)

BS/Civil Engineering/California State University – Sacramento, with Honors
Professional Civil Engineer/CA/C52850, NV, WA, FL
Professional Structural Engineer/CA/S4548, NV, WA, IL

Mr. Tehaney has over 25 years of experience in civil and structural engineering in a variety of water and wastewater projects. Mr. Tehaney's experience also includes major transportation projects and health care projects for both municipal and private clients throughout California, Nevada and the Pacific Northwest. Mr. Tehaney has been progressively responsible for the structural analysis and structural design of hydraulic structures, reservoirs, pumping stations, fish screens, buildings and bridges, and has served as a technical quality assurance/quality control reviewer for many projects. He also has over five years of experience performing structural plan review and site data review (geotechnical, engineering geologic and ground motions) for hospital building projects with the State of California.

- *North Shore Terminal Reservoir, Utah*
- *University Mound Reservoir, San Francisco, CA*
- *19 Reservoir Evaluations, San Bernardino, CA*
- *Bellevue Reservoir Seismic/Structural Rehabilitation, Bellevue, CA*

Jerry Gantney, PE, PLS – Civil Lead

BSCE, Civil Engineering, California Polytechnic University, Pomona
Professional Engineer: TX
Civil Engineer: CA
Professional Land Surveyor: CA

Mr. Gantney is an engineer with extensive experience in reservoirs and pump stations. He has worked closely with Project Manager Miko Aivazian on previous successful reservoir projects for the

Chevy Chase Reservoir in Glendale CA and the Evan Reservoir in Riverside CA. Mr. Gantney has particular expertise in site layout design and will ensure that the layout of the reservoir, pump station and other facilities are compatible with effective operation and maintenance work and do not adversely affect surrounding residents.

David Palmer, PE, SE (Structural)

BS/BSc/Civil Engineering/2000/University of the Pacific
MS/MSc/Civil and Environmental Engineering/2002/University of California at Davis
Professional Civil Engineer/CA/65089
Professional Civil Engineer/AK/12066

Mr. Palmer is a licensed professional engineer with nine years of experience in structural engineering. As the Structural Group Leader, Mr. Palmer works directly with the Chief Structural Engineer to develop and implement the company's standards associated with structural engineering. Additionally, he works directly with the other Discipline Group Leaders to develop and implement the company's standards for project execution and delivery as they pertain to the Design Disciplines. Other management responsibilities include cost estimating, budget and schedule management, mentoring and teaching, structural team management, and quality review.

As an engineer within design, Mr. Palmer is responsible for structural design, including calculations, modeling, drawing production, and specification writing. Mr. Palmer is experienced in concrete design, masonry design, steel design, and wood design, using the International Building Code (IBC), the California Building Code (CBC), and the Uniform Building Code (UBC). He is also experienced in retrofitting and rehabilitating existing structures and facilities. Additional responsibilities and experience include providing engineering services during construction.

Chris Thunhorst, PE – Electrical/Instrumentation Lead

BSEE, North Carolina State University, 2005
AAS, Asheville-Buncombe Technical Community College, 2001
Professional Engineer: OH, KY, TN, IN, PA

Mr. Thunhorst is a Senior Associate in the firm's Irvine office and he serves as Hazen and Sawyer's Electrical and Instrumentation Group Leader for the West Region. Mr. Thunhorst has over 15 years of experience in electrical engineering for building systems, water and wastewater treatment facilities, and pumping stations associated with water distribution and wastewater collection systems.

4.6 Staff Availability

Our project team members are fully committed to this important project and will make it their top priority. **Table 4.6-1** below shows each key project team member, their years of experience and their availability to assist on this project.

TABLE 4-.6-1 Summary of Staff Experience and Their Availability

Personnel Name/ Key Role	Years of Experience	Current Commitments	Availability
James Borchardt, PE *Principal In Charge*	37	• Beverly Hills Storage and Pump Station Rehabilitation • Weymouth Filter Rehabilitation • Yorba Linda Water District Fairmont Pump Station • Pure Water IPR/DPR Predesign	20%

John Tehaney, SE, PE *QA/QC*	25	• RD 2035 WDCWA Joint Intake ESDC • Lake Oswego WTP Expansion ESDC	50%
Miko Aivazian, PE *Project Manager*	28	• City of South Pasadena Graves Reservoir Replacement • City of San Diego Pure Water Program • Los Angeles County Devils Gate Dam and Reservoir	80%
Matthew Huckaby, PE *Project Engineer*	10	• City of South Pasadena Graves Reservoir Replacement • City of San Diego Pure Water Program • LACDPW Devils Gate Water Conservation Project	90%
Jerry Gantney, PE, PLS *Civil Grading/Pipelines*	39	• Lomita Cypress Water Production Facility • LADWP North Hollywood West Water Treatment Facility • Coachella Valley Water District Chromium 6	70%
George Tey, PE *Pump Sizing*	24	• Yorba Linda Fairmont Buster Station • Las Vegas IPS-3 • Lindley Reservoir	75%
David Palmer, SE, PE *Reservoir Structural*	15	• RD2035 Joint Intake (ESDC) • Seal Beach Pump Station • City of Sacramento SACWTP (ESDC) • NSB SA-10 W&WWTP (ESDC)	60%
Chris Thunhorst, PE *Electrical/Instrumentation Lead*	15	• Lomita Cypress Water Production Facility • LADWP North Hollywood West Water Treatment Facility • Coachella Valley Water District Chromium 6	70%
James Loucks, CCE, PMP *Cost Estimating*	35	• Yorba Linda Fairmont Booster Station • Lindley Reservoir	40%
Lynn Grijalva, PE *Public Outreach*	35	• LADWP San Fernando Basin Remediation • Lomita Cypress Water Production Facility • Coachella Valley Water District Chromium 6 Treatment Facilities Design and Construction	20%
Sylvana Ghiu, PhD, PE *water Quality*	13	• Coachella Valley Water District Chromium 6 Treatment Facilities Design and Construction • California Water Service Company, Well 272	35%

5.0 Other Personnel

5.1 Subconsultants' Experience

For this project, we have included a team of subconsultants that not only have experience working on similar projects, but also have past working experience with MWH on similar reservoir and pump station projects. We have also included AirX for potholing if their services become necessary in future. The following is a brief summary of each of our subconsultant firms proposed for this project:

Since 1951, **Hazen and Sawyer** has focused on two critical activities – helping our clients provide safe drinking water to their customers, and controlling water pollution and its effects on the environment.

Our focus brings us exceptional challenges – such as the largest drinking water UV disinfection installation in the world, upgrade of major wastewater treatment plants to reduce nutrient discharges to sensitive receiving waters, and recharging vital drinking water aquifers with highly-treated wastewater effluent, renewing a valuable resource.

Our focus also makes us home to many of the worlds' most knowledgeable and experienced environmental engineers and scientists, each seeking a challenging and rewarding career while making an important contribution to the communities in which we work.

Our commitment to our clients is absolute. Our expert process groups contribute to the latest research and determine how to apply the most effective and efficient technologies to engineer solutions to your challenges.

Your goals are our goals, and we offer the insight and experience needed to achieve and exceed them.

Fugro Consultants, Inc. is one of the United States operating units of Fugro NV, a global geotechnical and geoscience consulting and marine survey firm. Fugro operates in 60 countries from more than 250 offices, including 30 in the United States. With 12,165 employees worldwide, including more than 2,200 staff in the United States, we have the personnel and experience to customize solutions for our clients.

Today's Fugro is the result of organic growth, merger, and acquisitions (see Figure 1 for timeline). As a result of this growth, we have expanded our services, staff, and facilities to manage projects of any size, duration, or location. In California alone, we have 10 offices staffed with 165 engineers, geologists, surveyors, construction materials testing specialists, and technicians. In addition, Fugro is the only geotechnical firm in California to offer the combination of Cone Penetration Testing (CPT), laboratory testing, and construction materials engineering and testing services – all in-house.

The Prizm Group (TPG) was formed in 1998 with its corporate office in Norco, CA. TPG provides design engineering and surveying of public works projects throughout Southern California. TPG provides a large portion of its surveying services to civil engineering companies that do not staff their own survey departments. TPG has participated in numerous projects for several private and public agencies. By working with design engineer clients, TPG has gained the patience and understanding necessary to identify, communicate, and solve conflicts that arise on any given project. TPG provides services such as complete subdivision planning, engineering design and construction surveying, water, reservoir, sewer, street, and storm drain engineering design and construction surveys, plant 3-D modeling design and construction surveys, volume studies, records of survey, and legal description exhibit preparation.

AIRX Utility Surveyors is a California state-certified Small Business (#36366) and certified by the Coalition of Southern California Public Agencies. All services are supervised by licensed individuals for Professional Services/ General Engineering (Class A) requirements. AIRX provides potholing, utility locating, and subsurface utility engineering services in Southern California. Registered civil engineers and land surveyors manage the company. AIRX utilizes AutoCAD for utility locating, potholing services, and data management. This approach provides the most practical and efficient means to research, locate, survey, and manage the data properly to verify the exact location of existing underground facilities.

5.2 Subconsultant's Qualifications

We have selected our subconsultants based on their past experience with reservoir and pump station projects and also past experience working with MWH. Table 5.2-1 below lists a few projects that reflect our subconsultant's relevant experience.

TABLE 5.2-1 Subconsultants Qualifications

Firm Name/Role	Background/Qualifications
Hazen & Sawyer 1149 South Hill Street, Suite 450 Los Angeles, CA 90015 Tel: (213) 234-1080 Fax: (213) 765-0261 Email: nblute@hazenandsawyer.com	▪ City of Manhattan Beach – Investigation of Colored Water and Disinfection Residual Stability ▪ City of Lomita – Cypress Water Production Facility Upgrades and Zone 2 Connection Projects ▪ City of Lomita – Cypress Water Production Facility Off-Line Testing ▪ Coachella Valley Water District – Chromium 6 Water Treatment Facilities Design and Construction
Fugro Consultants Inc. (Geotechnical) 700 S. Flower Street, Ste. 2116 Los Angeles, CA 90017 Tel: (213) 788-3500 Fax: (213) 788-3526	▪ Chevy Chase 968 Reservoir and Pump Station – Glendale, CA ▪ Oak Canyon Reservoir Project – Oak Park, CA ▪ Oak Park Zone III Water Reservoir, Oak Park, CA ▪ Saddle Tree, Woolsey Canyon, Jed Smith and Twin Lakes Tanks, Los Angeles County, California ▪ Geohazard/Seismicity Evaluation of Three Existing Steel Water Storage Tanks ▪ Los Osos Wastewater Project, San Luis Obispo ▪ Conejo Valley Reservoir, Pipeline, Valve Vaults
The Prizm Group (Surveying) 310 North Cota Street, No. 1 Corona, CA 92880 Tel: (951) 737.4406 Email: vkleppe@the-prizm-group.com	▪ Substantial expertise in surveying ▪ Gilbert Street Complex Reservoir ▪ 29 Palms Water District 2400 Reservoir ▪ Elsinore Valley MWD Village Reservoir ▪ Numerous projects performed as subconsultant to MWH
AirX Utility Surveyors 2534 East El Norte Parkway Suite. C Escondido, CA 92027 Tel. 760.480.2347 Fax 760.739.8034 jmcelroy@airxus.com	▪ Utility Surveyors ▪ City of San Diego ▪ City of Escondido ▪ Inland Empire Utilities Agency ▪ Numerous projects performed as subconsultant to MWH

6.0 References

MWH is known throughout the water industry for its ability to provide high-quality projects to public agency clients. Table 6-1 below lists the reference information for our clients for whom our team members have performed directly relevant work in the past. The most valued indication of our success in achieving client goals for quality is the satisfaction of our clients, and we encourage the City to contact the references below.

Table 6-1 Project References

Name of Organization	Project Name	Contact Person/ Contact Information	MWH Team Member
City of Riverside, Public Utilities Dept. 3900 Main Street Riverside, CA 92522	▪ 16 MG Linden Reservoir Rehabilitation Project ▪ 16 MG Evans Reservoir Replacement Project	Contact: John Farley, PE Phone: 951.826.5705 Contact: Eric Escobar, PE Phone: 951.826.5821	Miko Aivazian, PE Matt Huckaby, PE Jerry Gantney, PE
City of South Pasadena 1414 Mission Street South Pasadena, CA 91030	▪ 1.3 MG Wilson Reservoir Replacement Project	Contact: John Wolitarsky, PE Phone: 626.403.7383	Miko Aivazian, PE Matthew Huckaby, PE Raphael Bui, PE
City of Glendale Water and Power 141 N. Glendale Ave Glendale, CA 91206	▪ 16 MG Chevy Chase Reservoir Replacement Project	Contact: Raja Takidin, PE Phone: 818.548.3906 Contact: Peter Kavounas Phone; 909.484.3888	Miko Aivazian, PE Matt Huckaby, PE Raphael Bui, PE Jerry Gantney, PE
City of Arcadia 11800 Goldring Road Arcadia, CA 91066	▪ 5 MG St. Joseph Reservoir ▪ Baldwin Reservoir Seismic Evaluation	Contact: Ken Herman, PE Phone: 626.256.6654	Miko Aivazian, PE Raphael Bui, PE John Tehaney, SE Jerry Gantney, PE
City of Banning 99 E. Ramsey Street Banning, CA 92220	▪ 1.5 MG Sun Lakes Pre-stressed Reservoir	Paul Toor, PE (City of South Pasadena) Phone: 626.403.7240	Miko Aivazian, PE Raphael Bui, PE Craig Wilcox, SE
City of Lomita 24300 Narbonne Avenue Lomita, CA 90717	▪ Cypress Water Production Facility Off Line Testing ▪ Cypress Water Production Facility Upgrades and Zone 2 Connection Projects	Contact: Mark McAvoy, PE Phone: 626.256.6654	Lynn Grijalva, PE Jerry Gantney, PE Silvana Ghiu, PE Chris Thunhorst, PE
City of Manhattan Beach 3621 Bell Avenue Manhattan Beach, CA 90266	▪ Investigation of Colored Water Occurrence in Distribution & Disinfection Residual Stability	Raul Saenz, Utilities Manager, Phone 310.802.5315	Nicole Blute, PE Silvana Ghiu, PE

7.0 Related Projects

7.1 Similar Projects

No two projects ever present the same challenges or are solved the same way. Experience will determine how a challenge is approached. During MWH's 60 year history in Southern California, we have run into challenging projects and have been innovative with our solutions. The following project examples are similar in scope to the proposed Peck Reservoir and are performed by our project manager and key team members.

16.0 MG Evans Reservoir Replacement Project

City of Riverside Public Utilities (Riverside, CA)

Actual Bid: $13.15M
Final Construction Cost: $13.3M
Completion Date: 2013

Miko Aivazian, Matt Huckaby and Raphael Bui provided engineering services, bidding assistance, and construction management services (prior to joining MWH) for the construction of the Evans Reservoir Replacement Project. The project scope included:

- *Demolition of the Existing 16.0 MG Reservoir*
- *Modifications and Replacement of all Major Yard Piping (60- to 72-inch piping, valves, etc.)*
- *Construction of a new 16.0MG Cast-In-Place Concrete Reservoir*
- *New 72-inch magnetic Type Flowmeter/Vault*
- *New Reservoir Overflow/Drain Piping*

Miko originally provided constructability review of the project after the completion of the design by another consultant and was able to offer the City over $2.5M in savings by enhancing several elements of the project. These enhancements included the following:

- *Reservoir Foundation Earthwork*
- *Reservoir Interior Lining*
- *Reservoir Roof Improvements*
- *Reservoir Piping (tie-ins)*
- *Reservoir Architectural Improvements*

This project involved several key challenges, including:

- *Construction in a Residential Area (apartments and school)*
- *Construction near Electrical Power Lines*
- *Construction in a Compact Site*
- *Fire Station within the site*
- *Maintain Daily Site Operations*

MWH team members provided engineering and inspection services to the City and managed all contractor activities since start of the project in 2010. Our project services include:

- *Review Submittals*
- *Respond to RFIs*

- *Review and Approve Change Orders*
- *Attend Weekly Construction Meetings*
- *Provide Inspection Service*
- *Manage Construction Site*
- *Provide Engineering Services for any Design Changes*

This project was completed in April of 2012, two months ahead of schedule.

5.0 MG St. Joseph Reservoir

City of Arcadia, CA

Actual Bid: $3.12M
Final Construction Cost: $3.16M
Completion Date: 2004

St. Joseph Reservoir No. 1, with a capacity of 5 MG, is located at 230 North Second Avenue in the City of Arcadia. The reservoir site originally consisted of two existing reservoirs (one 6 MG and one 3 MG), two wells, a pumping station, and a chlorine building. The deteriorated 3 MG circular Reservoir No. 1 was evaluated and the cost-effective decision was to demolish and replace it. The new reservoir is a rectangular cast-in-place concrete, flat-bottom, partially buried reservoir and is 195-feet long by 170-feet wide with a water depth of 21-feet. The reservoir also includes two interior vaults for inlet and outlet piping and valves. The concrete overflow structure of the new reservoir is 12-feet long by 3-feet wide with a 24-inch diameter overflow pipe that is tied into a 48-inch diameter airgap manhole on the southeast corner outside of the reservoir.

This reservoir is located in a seismically active area; therefore, special design considerations were required to adequately transfer seismic forces into the load carrying elements of the reservoir. The view from the West side of the reservoir along Second Avenue was important to the City; therefore, an architectural elevation that consisted of an enclosure building (penthouse) above the reservoir with four architectural arches along Second Avenue and one along the South wall was provided. The arch columns were constructed of block masonry pilasters with stucco finish above the arches. This architectural theme from the Second Avenue side has successfully hidden the reservoir site from public view and the architecture blends well with the surrounding neighborhood and adjacent buildings. This project was later awarded by the "American Public Works Association (APWA)".

15.0 MG Chevy Chase 968 Reservoir and Pump Station

City of Glendale Water and Power (Glendale, CA)

Actual Bid: $20M
Final Construction Cost: $20.2M
Completion Date: 2009

Our proposed design team members, Miko Aivazian, Matthew Huckaby, and Raphael Bui, completed (prior to joining MWH) the construction of this 15.0 MG reservoir and pump station for the City of Glendale. Miko Aivazian, as the Project Manager, and Raphael Bui, as the Civil/Site Lead, were involved in this project from conceptual design to final design and provided construction services during the 18-month construction period. Miko Aivazian managed this project successfully and coordinated all the efforts with the City for the entire duration of the project.

The new Chevy Chase 968 Reservoir replaces the existing 14.5 MG buried reservoir that was built in the early 1920s. The new irregularly shaped reservoir was designed to take advantage of the entire space to maximize storage capacity. The existing irregularly shaped reservoir had an average water depth of 21 feet and the new reservoir has a greater water depth of 25 feet to achieve the same or greater volume.

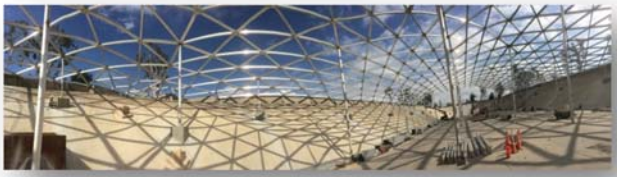
The new reservoir included the following features:

- *Volume of approximately 15.0 MG*
- *High water level of 968 feet with a top of roof elevation of 971 feet (providing 2 feet for wave sloshing in a seismic event)*
- *Depth of 24 feet to match other reservoir facilities in the 968 Zone*
- *Two cells that can be operated independent of each other or together.*
- *Minimum of 2.5 feet of soil cover over the entire reservoir*
- *Vertical side walls, shortened through the use of a hopper-bottom design of the floor*
- *Two-way suspended roof slab*
- *Drainage and overflow piping*
- *An underdrain leak detection system*
- *3-1200 gpm vertical turbine pump station for pumping to 1290 pressure zone. The pump station was below grade with the electrical room housed in an above-grade building.*

16.0 MG Linden Reservoir Rehabilitation Project

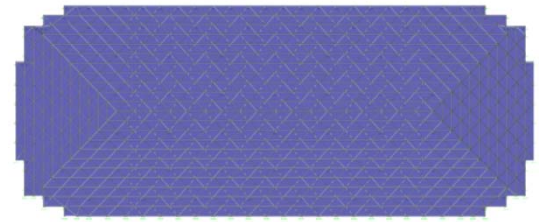
City of Riverside Public Utilities (Riverside, CA)

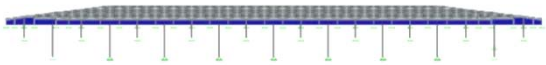
Actual Bid: $5.28M
Final Construction Cost: $5.4M
Completion Date: 2014

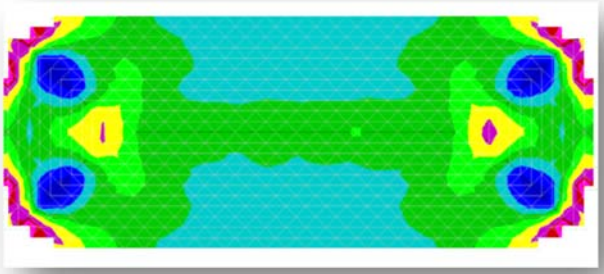


Existing Linden reservoir is a 16 MG concrete lined berm supported reservoir with a steel roof that was originally constructed in 1927 with a capacity of 12 MG. The original reservoir was repaired in 1980's and a concrete wall was added

around the perimeter to increase the capacity from 12 MG to 16 MG. In 2012, the City requested a preliminary investigation and seismic study for the existing reservoir and recommended alternatives for the rehabilitation of the existing structure to support seismic loads and the loads induced by the replacement of the existing roof with a new roof system. Team members Miko Aivazian and Matt Huckaby performed the following tasks for this project:







1. A physical inspection of the reservoir interior and exterior including all structural and piping components;
2. Prepared a seismic evaluation of the existing reservoir structure including the perimeter concrete wall;
3. Prepared an earthquake retrofit strategy for the existing reservoir structure;
4. Evaluation of 11 alternatives for the roof replacement. The recommended roof was a pre-fabricated aluminum roof due to its light weight and long life expectancy. The new aluminum roof would reduce the seismic loads transferred to the existing tank structure;
5. Prepared Life Cycle analysis for all repair alternatives complete with construction cost estimates, life expectancy and ranking of alternatives;
6. Prepared a Final Report for recommendations for rehabilitation of the tank structure and replacement of the existing roof;
7. Final design and engineering services for the reservoir upgrades and the new recommended roof design replacement; and
8. Engineering and inspection services during construction of the upgrades and roof replacement.

Project team members Miko Aivazian, Matt Huckaby, and Raphael Bui (prior to joining MWH) successfully completed this project in 2014. The reservoir was disinfected and placed back in service on schedule and within budget. The repairs and the new roof will extend the life of the Linden Reservoir for another 60 years.

1.5 MG Sun Lakes Reservoir

City of Banning, CA

Actual Bid: N/A
Final Construction Cost: $2.0M
Completion Date: 2003/2004

MWH provided design and construction management services for the construction of a 1.5 MG pre-stressed buried concrete reservoir for the City of Banning. This reservoir was located on a hillside above a residential neighbourhood, which made it a highly visible project with potential for impact on the public. The project was originally designed by another consultant. MWH was requested by the City to provide a constructability review of the project. Miko Aivazian performed the constructability reviews and was able to provide several enhancements to the project that would also save construction costs. MWH

management ensured that the construction was in compliance with the applicable codes, permits and contract requirements resulting in a smooth project with no concerns from the public. Miko Aivazian provided both project management and construction inspection services for this project. Miko Aivazian worked closely with Gateway Pacific and coordinated all RFI's and submittals for this project. The reservoir construction was successfully completed in 2004 within budget and schedule.

1630 West Recycled Water Pump Station

Inland Empire Utilities Agency (IEUA), Chino, CA

Actual Bid: N/A
Final Construction Cost: $12M
Completion Date: 2011

This pump station is designed to pump 3-MG of recycled water to the 1630 West Recycled Water Reservoir. The purpose of this pump station is to interconnect existing pressure zones with new customers, transmission mains, and storage facilities in a new pressure zone. This pump station is located in Vineyard Park in the City of Ontario and consists of three vertical turbine pumps, a new masonry block building, a surge tank, a new parking lot, remote operating capabilities, and other facilities necessary for the operation of the pump station.

This project is partially funded by the United States Bureau of Reclamation (USBR) Economic Stimulus Funds, as well partially funded by American Recovery and Reinvestment Act (ARRA) - financing through the USBR. The work consists of all materials, labor, tools, equipment, apparatus, facilities, transportation and incidentals necessary to furnish, deliver and construct the following: Construct the new 1630 West Recycled Water Pump Station, consisting of three 250 hp vertical turbine pumps, piping, valves and appurtenances; Construct approximately 200 linear feet of 24-inch pipeline with connection to existing 24- inch recycled water lines; Electrical Equipment room with MCC's, switchgear, feeds, switches, transformers and panels; Install instrumentation and controls at new 1630 West Recycled Water Pump Station; Installation of the Vineyard Park restroom facility including specified features and utilities connections; and provide all other work required by the contract documents.

Cypress Water Production Facility Off-Line Testing (Hazen and Sawyer)

City of Lomita, CA

The Cypress Water Production Facility (CWPF) Off-Line Testing Plan was created in an effort to address concerns expressed by the residents of the City of Lomita in regards to hardness, alkalinity, taste, and odor. Hazen and Sawyer created a comprehensive testing plan to evaluate the treatment at the well and blending with Metropolitan Water District (MWD) imported water.

Implimentation. Hazen implemented the Off-Line Test plan to determine the treatment and blending conditions that produce an effluent that meets the range of water quality acceptable to the residents of Lomita. The project involved a continuous collaboration between Hazen, City staff, operators, and testing laboratory to adjust and adapt the testing plan as the project progressed. The tests included operation of the well with fill and draw cycles in the well, treatment, and reservoir system to mimic

normal operational conditions. Both the treatment conditions and blending quantities with MWD imported water will be varied as part of the test plan. A 60% well water and 40% MWD water blend and a 50% well water and 50% MWD water blend were tested to achieve a desired range of hardness and alkalinity.

Testing. A range of sodium hypochlorite feed rates were tested while maintaining a chlorine to ammonia ratio for chloramination control. The tank inlet was exposed to the air during portions of the test to maximize the aeration efficiency and methane and sulfide control; the inlet was submerged during other portions of the test in order to discern the removal efficiency with a lesser degree of aeration.

Water age was examined, and it was found that an age of two to three days contributed to the overall improvement of taste and odor and sulfide reduction.

Because Hazen worked collaboratively with the City staff, operators, and testing laboratory, the team was able to quickly adapt the tests and put the well and treatment plant back into production in time to meet the summer demands.

Cypress Water Production Facility Upgrades and Zone 2 Connection Projects (Hazen and Sawyer)

City of Lomita, CA

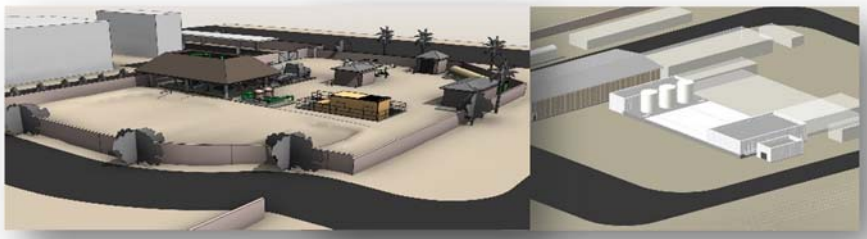
Final Construction Cost: $85,000
Project Date: 2016

CWTP Treatment Plant upgraded the disinfection facilities for blending with MWD of Southern California. The design included 2 new chlorine injection points, inline static mixing and flow modulating valves to insure the proper blend ratio is maintained for the 2,000 gpm blended drinking water leaving the plant. New chlorine and ammonia injection points were added to trim the final discharge of the treated well water before blending with MWD water. The work also included upgrading the existing 3.5 MG concrete reservoir to replace corroded hatches and level monitoring equipment. The reservoir ventilation system was upgraded to include a new 12,000 CFM ventilation exhaust fan to remove built-up methane and provide dryer air within the reservoir. The reservoir drain connection to the LA County Flood Control District's 60 inch RCP storm drain pipeline. The drain upgrades removed the existing 6 inch PVC drain and manhole vault with a new 12 inch PVC pressure pipe and a new 36 inch pressure manhole tee and blind flange in a new manhole. A new permit from the California Department of Water Quality, Division of Drinking Water will be provided on completion of the project. The pipeline portion of the project is estimated to be a 14 inch OD HDPE water main connected to the City's MWD turnout at their Appian Way Pump Station, consisting of about 2,500 feet along an existing Chevron Pipeline Property.

Chromium 6 Water Treatment Facilities Design and Construction (Hazen and Sawyer)

Coachella Valley Water District, CA

Total Fee: $22M
Project Cost: $222M
Design Completion: 2016
Construction Completion: 2019
Project Date: 2015-2019



The State of California released a new maximum contaminant level (MCL) for hexavalent chromium (Cr6) in drinking water, effective July 1, 2014. Numerous Coachella Valley Water District (CVWD) groundwater wells are anticipated to exceed the levels when sampled for compliance with the regulation. In anticipation of the new MCL, CVWD initiated a Domestic Source of Supply and Treatment Study in December 2013 to evaluate compliance options including treatment and non-treatment alternatives. Of the 31 wells above the MCL, the best Available Technologies (BAT) for Cr6 were analyzed for each CVWD site, including:

- Strong base anion exchange (SBA),
- Weak base anion exchange (WBA),
- Reduction coagulation filtration (RCF) or microfiltration (RCMF), and
- Reverse osmosis (RO).

Factors analyzed included cost, residuals handling, operations and maintenance complexity, consistency in treatment and blending, water loss to waste, footprint, and flexibility of the technology for removing constituents that are not currently regulated. Cost economies of scale in treatment and operations were evaluated, showing that costs can be lower by clustering wells together for treatment at a common location. A combination of treatment and regeneration strategies were recommended.

WBA treatment was determined to be most cost effective at 7 well sites clustered at 2 treatment locations because of high sulfate concentrations in the raw water (>80 mg/L), which would otherwise require high frequency of regenerations if SBA. WBA resin is not regenerated, and extended life exceeding one year has been confirmed in CVWD groundwater pilot testing. Economies of scale were found in clustering wells for these two WBA treatment locations. Over 10 miles of raw water conveyance and trans- mission piping is associated with these sites.

SBA was identified by CVWD as most advantageous for groundwater Cr6 treatment at 23 of the existing well sites. A centralized resin regeneration approach was selected to provide significant cost savings, reduced water loss, and operational advantages including hazardous waste management. Resin would be extracted from the vessels at a frequency varying from once every few weeks to once every few months (depending on the well site and use), transported to the central facility for regeneration, and then loaded back into the resin vessels at the well sites. Optimization testing for treatment of the regeneration waste and solids handling is being evaluated, with non-hazardous liquid waste being reused or evaporated on site and hazardous solid waste taken off-site to a licensed disposal facility.

8.0 Contract Exceptions

Should we be selected for this work, we would like the opportunity to negotiate the following two amendments with you:

1. We request that an additional sentence be added to 15(c) "Nothing in this provision shall be construed as a transfer of ownership of Contractor existing intellectual property rights embedded in or used in the development of the Data or other work product, including all processes, methods and know-how. Contractor shall be permitted also to retain a copy of all Data and work product for its records, except for the information provided by the City, which shall be returned or destroyed at the City's request. Any re-use of the Data and work product without Contractor's engagement shall be at the sole risk and liability of the City."

2. We request that the following statement be added to the agreement "In recognition of the relative risks and benefits of the project to both City and Contractor, the parties agree, to the fullest extent permitted by law, to limit the aggregate liability of Contractor to twice the compensation paid for the Services. In no event shall either party be liable to the other for any indirect, incidental, special or consequential damages whatsoever (including but not limited to lost profits or interruption of business) arising out of or related to the services provided under this agreement."

Thank you for your consideration of these amendments. Our proposal to provide services is valid for 90 days after the RFP deadline of February 10, 2016.

We acknowledge the receipt of Addendums issued by the City. A signed copy of the addendum is included in Appendix B.

9.0 Project Schedule

The project schedule presented in the following page of our proposal is based on the scope of work and time required for funding applications and processes. Our proposed schedule includes all tasks required from Notice-To-Proceed to completion of preliminary design, final design, bidding, and construction phases. The following is a brief summary of our proposed schedule milestones:

Notice to Proceed:	May 4, 2016
Kick-off Meeting:	May 10, 2016
Finish Basis of Design Report:	October 3, 2016
Finish Final Design:	July 24, 2017
Bid Phase:	September 1, 2017
Construction Start:	November 13, 2017
Construction End:	April 26, 2019

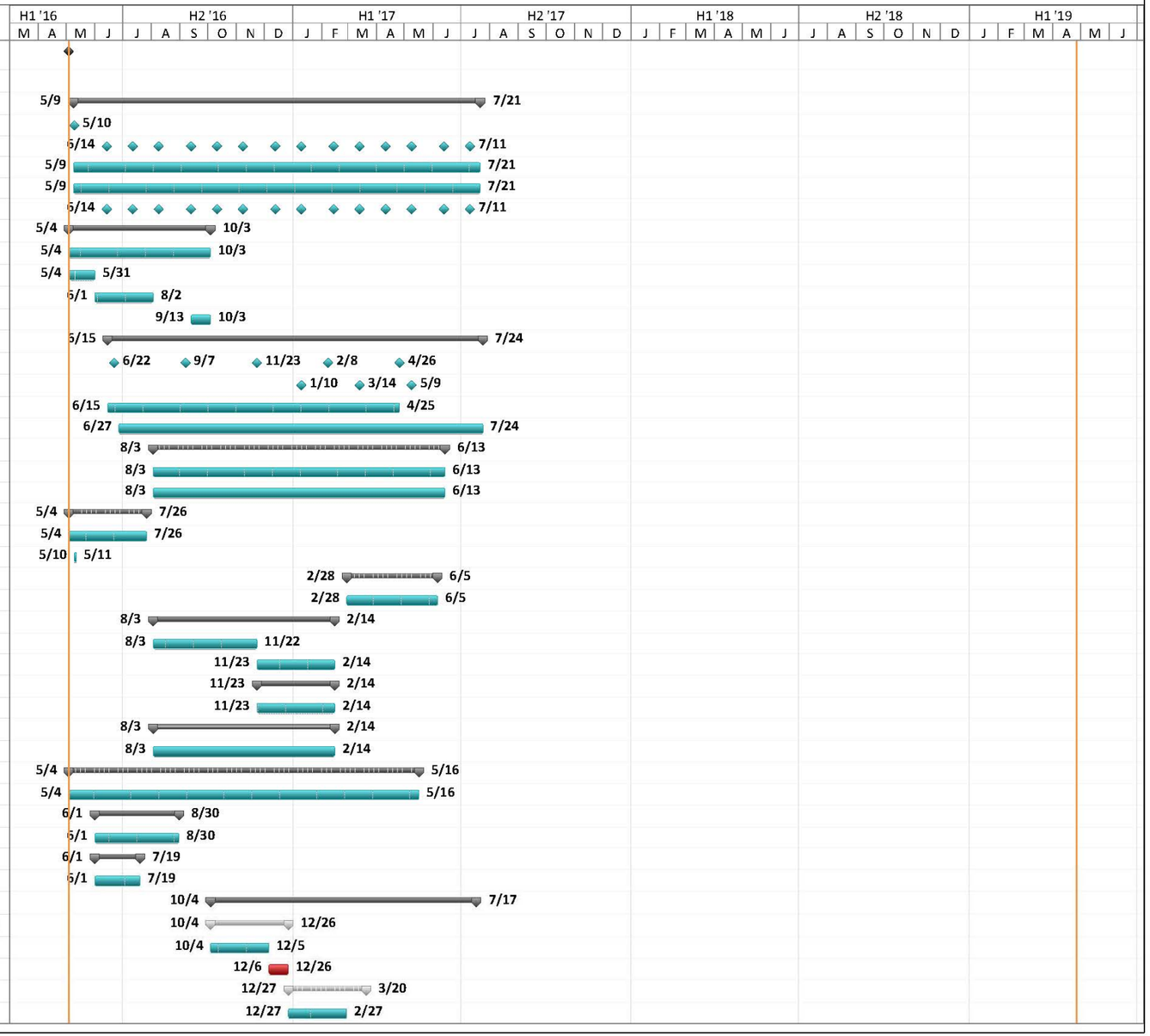
We are confident this schedule can be achieved if all coordination work is performed on a timely manner. MWH will revise and update the design schedule during the preliminary and final design phases to reflect any changes that may occur.

Note: Schedule extension due to outside agency reviews (e.g., DDW) and/or due to additional response to public and City Council comments may occur.

City of Manhattan Beach

Request for Proposal for Engineering Design Services for the Peck Ground Level Reservoir Replacement Project (RFP No. 1061-16)

ID	Task Name	Duration	Start	Finish
1	**NOTICE TO PROCEED**	1 day	Wed 5/4/16	Wed 5/4/16
2				
3	**Task 1 - Project Management and Meetings**	**315 days**	**Mon 5/9/16**	**Fri 7/21/17**
4	1.1 - Project Kickoff Meeting	1 day	Tue 5/10/16	Tue 5/10/16
5	1.2 - Monthly Coordination Meetings (14)	281 days	Tue 6/14/16	Tue 7/11/17
20	1.3 - Weekly Project Updates	315 days	Mon 5/9/16	Fri 7/21/17
21	1.4 - Quality Assurance and Quality Control Program	315 days	Mon 5/9/16	Fri 7/21/17
22	1.5 - Monthly Progress Reports (14)	281 days	Tue 6/14/16	Tue 7/11/17
37	**Task 2 - Basis of Design Report**	**109 days**	**Wed 5/4/16**	**Mon 10/3/16**
38	2.1 - Basis of Design Report (BODR)	109 days	Wed 5/4/16	Mon 10/3/16
39	2.2 - Analyze City's Existing Water System Use	20 days	Wed 5/4/16	Tue 5/31/16
40	2.3 - Analyze System Storage Requirements and Effects	45 days	Wed 6/1/16	Tue 8/2/16
41	2.4 - Confirm BODR's Findings with the City and Define	15 days	Tue 9/13/16	Mon 10/3/16
42	**Task 3 - Public Outreach**	**289 days**	**Wed 6/15/16**	**Mon 7/24/17**
43	3.1 - Community Outreach Meeting Presentations (5)	221 days	Wed 6/22/16	Wed 4/26/17
49	3.2 - City Council Meeting Presentations (3)	86 days	Tue 1/10/17	Tue 5/9/17
53	3.3 - Presentation Materials	225 days	Wed 6/15/16	Tue 4/25/17
54	3.4 - Website and Hosting	281 days	Mon 6/27/16	Mon 7/24/17
55	**Task 4 - Environmental Compliance and Permitting**	**225 days**	**Wed 8/3/16**	**Tue 6/13/17**
56	4.1 - Environmental Assessment to Comply with CEQA Act	225 days	Wed 8/3/16	Tue 6/13/17
57	4.2 - Permitting Documents	225 days	Wed 8/3/16	Tue 6/13/17
58	**Task 5 - Background Research**	**60 days**	**Wed 5/4/16**	**Tue 7/26/16**
59	5.1 - Research Available Water System Records	60 days	Wed 5/4/16	Tue 7/26/16
60	5.2 - Field Investigations to Identify Field Conditions	2 days	Tue 5/10/16	Wed 5/11/16
61	**Task 6 - Drinking Water Permit Amendment**	**70 days**	**Tue 2/28/17**	**Mon 6/5/17**
62	6.1 - Document Preparation	70 days	Tue 2/28/17	Mon 6/5/17
63	**Task 7 - Water Quality**	**140 days**	**Wed 8/3/16**	**Tue 2/14/17**
64	7.1 - Review of City's 2010 Water Master Plan	80 days	Wed 8/3/16	Tue 11/22/16
65	7.2 - Update City's Hydraulic Model	60 days	Wed 11/23/16	Tue 2/14/17
66	**Task 8 - Water Blending**	**60 days**	**Wed 11/23/16**	**Tue 2/14/17**
67	8.1 - Optimization of Blending Process	60 days	Wed 11/23/16	Tue 2/14/17
68	**Task 9 - Water System Ops Plan During Construction**	**140 days**	**Wed 8/3/16**	**Tue 2/14/17**
69	9.1 - Analyze/Update Operations Plan	140 days	Wed 8/3/16	Tue 2/14/17
70	**Task 10 - Utility Coordination**	**270 days**	**Wed 5/4/16**	**Tue 5/16/17**
71	10.1 - Utility Research	270 days	Wed 5/4/16	Tue 5/16/17
72	**Task 11 - Geotechnical Engineering Services**	**65 days**	**Wed 6/1/16**	**Tue 8/30/16**
73	11.1 - Geotechnical Engineering Report	65 days	Wed 6/1/16	Tue 8/30/16
74	**Task 12 - Surveying and Existing Site Conditions**	**35 days**	**Wed 6/1/16**	**Tue 7/19/16**
75	12.1 - Topographic and Land Survey	35 days	Wed 6/1/16	Tue 7/19/16
76	**Task 13 - Draft Construction Plans and Specifications**	**205 days**	**Tue 10/4/16**	**Mon 7/17/17**
77	**13.1 - 30% Plans and Specifications**	**60 days**	**Tue 10/4/16**	**Mon 12/26/16**
78	Prepare and Submit 30% Plans and Specifications	45 days	Tue 10/4/16	Mon 12/5/16
79	City Review of 30% Plans and Specifications	15 days	Tue 12/6/16	Mon 12/26/16
80	**13.2 - 60% Plans and Specifications**	**60 days**	**Tue 12/27/16**	**Mon 3/20/17**
81	Prepare and Submit 60% Plans and Specifications	45 days	Tue 12/27/16	Mon 2/27/17

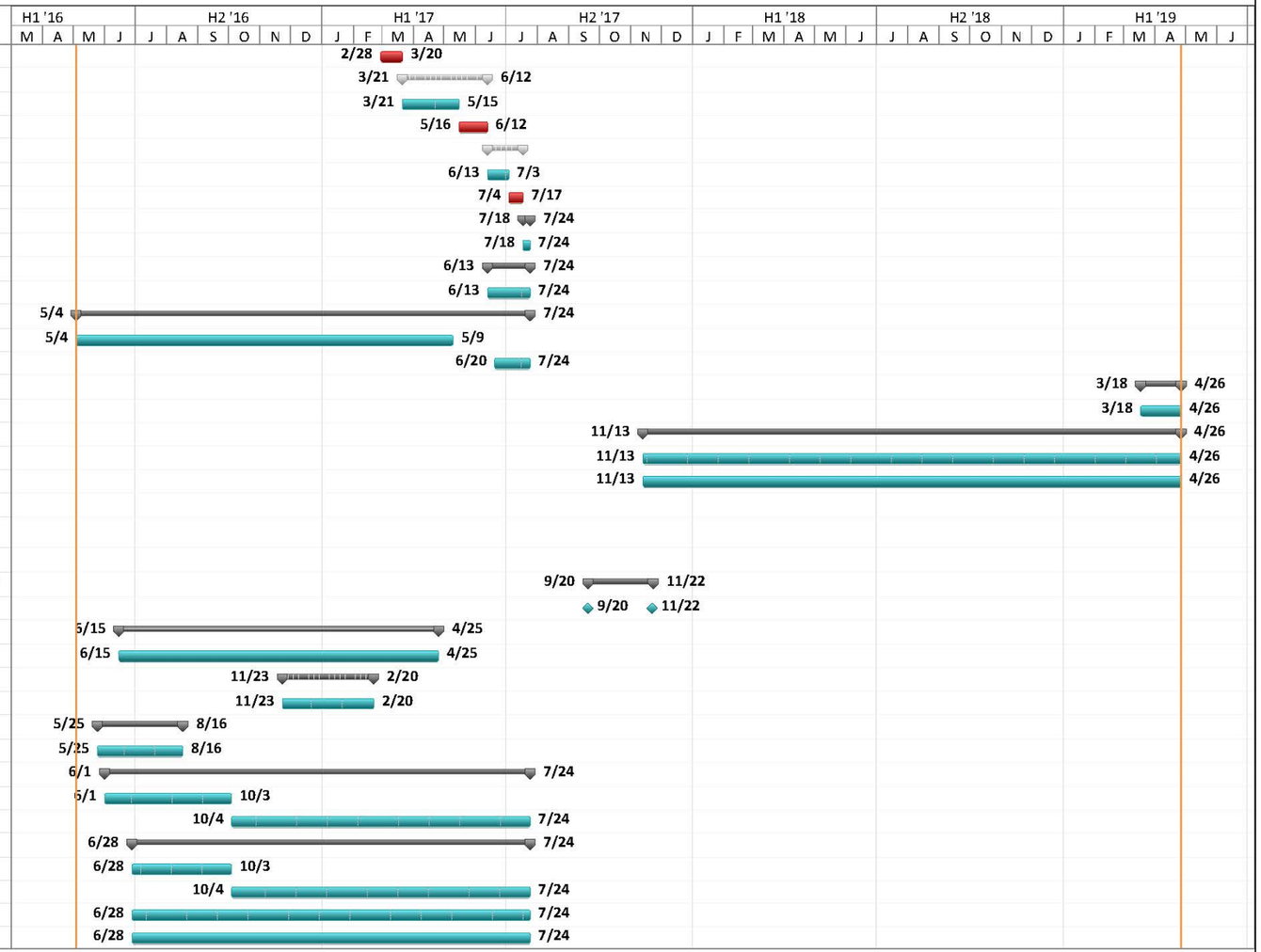


City of Manhattan Beach

Request for Proposal for Engineering Design Services

for the Peck Ground Level Reservoir Replacement Project (RFP No. 1061-16)

ID	Task Name	Duration	Start	Finish
82	City Review of 60% Plans and Specifications	15 days	Tue 2/28/17	Mon 3/20/17
83	**13.3 - 90% Plans and Specifications**	**60 days**	**Tue 3/21/17**	**Mon 6/12/17**
84	Prepare and Submit 90% Plans and Specifications	40 days	Tue 3/21/17	Mon 5/15/17
85	City Review of 90% Plans and Specifications	20 days	Tue 5/16/17	Mon 6/12/17
86	**13.4 - 100% Plans and Specifications**	**25 days**	**Tue 6/13/17**	**Mon 7/17/17**
87	Prepare and Submit 100% Plans and Specifications	15 days	Tue 6/13/17	Mon 7/3/17
88	City Review of 100% Plans and Specifications	10 days	Tue 7/4/17	Mon 7/17/17
89	**Task 14 - Final Construction Bidding Documents**	**5 days**	**Tue 7/18/17**	**Mon 7/24/17**
90	14.1 - Final PS&E Package	5 days	Tue 7/18/17	Mon 7/24/17
91	**Task 15 - Construction Cost Estimate**	**30 days**	**Tue 6/13/17**	**Mon 7/24/17**
92	15.1 - Construction Cost Est. Prior to 100% and Final Design	30 days	Tue 6/13/17	Mon 7/24/17
93	**Task 16 - Design Schedule and Est. Construction Schedule**	**319 days**	**Wed 5/4/16**	**Mon 7/24/17**
94	16.1 - Prepare and Maintain a Detailed Design Schedule	265 days	Wed 5/4/16	Tue 5/9/17
95	16.2 - Prepare a Detailed Construction Schedule	25 days	Tue 6/20/17	Mon 7/24/17
96	**Task 17 - As Built Plans**	**30 days**	**Mon 3/18/19**	**Fri 4/26/19**
97	17.1 - Prepare As Built Plans	30 days	Mon 3/18/19	Fri 4/26/19
98	**Task 18 - Construction Assistance**	**380 days**	**Mon 11/13/17**	**Fri 4/26/19**
99	18.1 - Review and Respond to Submittals	380 days	Mon 11/13/17	Fri 4/26/19
100	18.2 - Review and Respond to RFIs	380 days	Mon 11/13/17	Fri 4/26/19
101				
102	**OPTIONAL TASKS**			
103				
104	**Task 19 - Construction Meetings (2)**	**46 days**	**Wed 9/20/17**	**Wed 11/22/17**
105	19.1 - Construction Meetings	46 days	Wed 9/20/17	Wed 11/22/17
108	**Task 20 - Presentation Renderings**	**225 days**	**Wed 6/15/16**	**Tue 4/25/17**
109	20.1 - Presentation Renderings	225 days	Wed 6/15/16	Tue 4/25/17
110	**Task 21 - Computational Fluid Dynamic Modeling (CFD)**	**64 days**	**Wed 11/23/16**	**Mon 2/20/17**
111	21.1 - Prepare CFD Model	64 days	Wed 11/23/16	Mon 2/20/17
112	**Task 22 - Wells Water Quality Analysis**	**60 days**	**Wed 5/25/16**	**Tue 8/16/16**
113	22.1 - Additional Water Quality Analysis	60 days	Wed 5/25/16	Tue 8/16/16
114	**Task 23 - Future Manganese Treatment**	**299 days**	**Wed 6/1/16**	**Mon 7/24/17**
115	23.1 - Evaluate Future Manganese Treatment in BODR	89 days	Wed 6/1/16	Mon 10/3/16
116	23.2 - Implement Future Manganese Treatment into Final Design	210 days	Tue 10/4/16	Mon 7/24/17
117	**Task 24 - Potential Community Improvements**	**280 days**	**Tue 6/28/16**	**Mon 7/24/17**
118	24.1 - Evaluation of Community Improvements in BODR	70 days	Tue 6/28/16	Mon 10/3/16
119	24.2 - Modify Final Design to Implement Improvements	210 days	Tue 10/4/16	Mon 7/24/17
120	24.3 - Additional Project Management	280 days	Tue 6/28/16	Mon 7/24/17
121	24.4 - Additional Public Outreach	280 days	Tue 6/28/16	Mon 7/24/17



10.0 Fee

MWH proposes to perform the above-described scope of services on a time-and-material fixed fee basis in the not-to-exceed amount.

Our submitted fee proposal is “not-to exceed” and includes all direct and indirect costs including all labor, employee benefits, mileage, equipment, materials, insurances, and production costs.

Our proposed fee is based on the Scope of Services requested in the RFP and the Scope of Work described in the Section 1 of this proposal. Our fee estimate is based on the proposed completion schedule in Section 9.

We have included several optional tasks, Task 19 through Task 24 for services that are not requested in the RFP but may become necessary during the design phase of the project. MWH will only provide these services after written approval from the City.

Assumptions:

- City will provide all available reports and record drawings/documents.
- Construction inspections are not included.
- Construction meetings are not included
- Permitting is limited to assisting the City in filling out applications and contacts. All permit fees will be paid by the City.
- Environmental/CEQA is limited to obtaining a NEGDEC.
- Transient/surge analysis is not included.
- CFD modeling is not included (optional task 21).
- Potholing is not included.

PAGE INTENTIONALLY BLANK

Fee Breakdown Schedule

		MWH/Hazen and Sawyer - Project Engineering and Management Personnel													Subconsultants			
	Contract Hourly Rate	$270	$250	$240	$225	$175	$155	$130	$115	$110								
Activity No.	ACTIVITY DESCRIPTION	Company Officer	Project Manager	Principal Professional II	Principal Professional I	Supervising Professional	Senior Professional	Project Professional	Associate Professional	Administrative Assistant	TOTAL HOURS (Project Engineering / Management)	LABOR FEE (Project Engineering / Management)	Total ODCs	Miscellaneous Subconsultants	Geotechnical-Fugro	Surveying-The Prizm Group	SUBCONSULTANTS SUBTOTAL	TOTAL PROJECT COST
1.0	**Project Management**	**2**	**76**	**32**	**28**	**26**	**0**	**0**	**0**	**6**	**170**	**$ 38,730**	**$ 2,900**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 41,630**
1.1	Project Kickoff Meeting		4	2	2					1	9	$ 2,040					$ -	**$ 2,040**
1.2	Monthly Coordination Meetings (14 meetings)		32	14	14	14				1	75	$ 17,070	$ 1,500				$ -	**$ 18,570**
1.3	Weekly Project Updates		16							2	18	$ 4,220	$ 400				$ -	**$ 4,620**
1.5	Quality Assurance and Quality Control Program	2	16	16	12	12				1	59	$ 13,290	$ 600				$ -	**$ 13,890**
1.6	Monthly Progress Reports		8							1	9	$ 2,110	$ 400				$ -	**$ 2,510**
2.0	**Basis of Design Report (BODR)**	**2**	**28**	**56**	**56**	**132**	**32**	**0**	**0**	**4**	**310**	**$ 62,080**	**$ 1,600**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 63,680**
2.1	Prepare a Basis of Design Report	2	16	24	40	80	24			1	187	$ 37,130	$ 1,200				$ -	**$ 38,330**
2.2	Analyze City's Existing Water System Use/Storage		6	16		32	8			1	63	$ 12,290	$ 200				$ -	**$ 12,490**
2.3	Analyze System Storage Requirements/Effects		4	8	16	16				1	45	$ 9,430	$ 200				$ -	**$ 9,630**
2.4	Confirm BODR findings with the City and Define Improvements		2	8		4				1	15	$ 3,230					$ -	**$ 3,230**
3.0	**Public Outreach**	**0**	**72**	**56**	**8**	**8**	**4**	**0**	**60**	**7**	**215**	**$ 42,930**	**$ 2,800**	**$ 20,000**	**$ -**	**$ -**	**$ 20,000**	**$ 65,730**
3.1	Presentations at Five (5) Community Outreach Meetings		32	32						2	66	$ 15,900	$ 600				$ -	**$ 16,500**
3.2	Presentations at Three (3) City Council Meetings		24	24						2	50	$ 11,980	$ 600				$ -	**$ 12,580**
3.3	Prepare Presenation Materials		8			8			60	2	78	$ 10,520	$ 1,200				$ -	**$ 11,720**
3.4	Setup a Project Website and Host for nine (9) months		8		8		4			1	21	$ 4,530	$ 400	$ 20,000			**$ 20,000**	**$ 24,930**
4.0	**Environmental Compliance and Permitting**	**0**	**16**	**60**	**8**	**116**	**40**	**0**	**0**	**2**	**242**	**$ 46,920**	**$ 2,200**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 49,120**
4.1	Conduct Environmental Assessment to Comply with CEQA Act		12	60		80	40			1	193	$ 37,710	$ 2,000				$ -	**$ 39,710**
4.2	Prepare Required Permit Documents, Meetings, Etc.		4		8	36				1	49	$ 9,210	$ 200				$ -	**$ 9,410**
5.0	**Background Research**	**0**	**6**	**4**	**0**	**16**	**28**	**0**	**0**	**3**	**57**	**$ 9,930**	**$ 600**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 10,530**
5.1	Research and Obtain Available Documents, Record, Surveys, Etc.		2			12	24			2	40	$ 6,540	$ 400				$ -	**$ 6,940**
5.2	Field Investigations to Identify Field Conditions and Site Opportunities		4	4		4	4			1	17	$ 3,390	$ 200				$ -	**$ 3,590**
6.0	**Drinking Water Permit Amendment**	**0**	**4**	**0**	**0**	**16**	**0**	**0**	**0**	**1**	**21**	**$ 3,910**	**$ 200**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 4,110**
6.1	Provide Assistance to Prepare Documentation to Apply for a California State Water Resources Control Board Drinking Water Permit Amendment		4			16				1	21	$ 3,910	$ 200				$ -	**$ 4,110**
7.0	**Water Quality**	**0**	**6**	**28**	**4**	**0**	**40**	**0**	**0**	**2**	**80**	**$ 15,540**	**$ 400**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 15,940**
7.1	Review City's 2010 Water Master Plan and Disinfectant Residual Stability and Regulatory Compliance		4	4	4					1	13	$ 2,970					$ -	**$ 2,970**
7.2	Incorporate Data into City's Hydraulic Model for a System wide Improved Disinfection System Compliant with Stage 2 Disinfectant and Disinfection Byproduct Rule, Total Coliform Rule, and Groundwater Rule		2	24			40			1	67	$ 12,570	$ 400				$ -	**$ 12,970**
8.0	**Water Blending**	**0**	**4**	**8**	**8**	**8**	**0**	**0**	**0**	**1**	**29**	**$ 6,230**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 6,230**
8.1	Optimization of Blending Process /Future Iron and Manganese's Treatment System Considerations		4	8	8	8				1	29	$ 6,230					$ -	**$ 6,230**
9.0	**Water System Operations Plan During Construction**	**0**	**4**	**4**	**4**	**0**	**0**	**0**	**0**	**1**	**13**	**$ 2,970**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 2,970**
9.1	Analyze Water System Supply and Demand to Determine the Required System Operation During Reservoir Construction		4	4	4					1	13	$ 2,970					$ -	**$ 2,970**
10.0	**Utility Coordination**	**0**	**2**	**0**	**0**	**0**	**8**	**0**	**30**	**1**	**41**	**$ 5,300**	**$ 200**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 5,500**
10.1	Provide Utility Research by Sending Notices to Utility Agencies		2				8		30	1	41	$ 5,300	$ 200				$ -	**$ 5,500**
11.0	**Geotechnical Engineering Services**	**0**	**2**	**4**	**4**	**0**	**0**	**0**	**0**	**1**	**11**	**$ 2,470**	**$ -**	**$ -**	**$ 32,000**	**$ -**	**$ 32,000**	**$ 34,470**
11.1	Prepare a complete Geotechnical Investigation Report		2	4	4					1	11	$ 2,470			$ 32,000		**$ 32,000**	**$ 34,470**
12.0	**Surveying and Existing Site Conditions**	**0**	**2**	**0**	**8**	**0**	**8**	**0**	**8**	**1**	**27**	**$ 4,570**	**$ -**	**$ -**	**$ -**	**$ 10,000**	**$ 10,000**	**$ 14,570**
12.1	Provide Topographic and Land Surveying Services Required to Identify Site Features Required for Preparation of Construction Documents		2		8		8		8	1	27	$ 4,570				$ 10,000	**$ 10,000**	**$ 14,570**
13.0	**Draft Construction Plans and Specifications**	**0**	**128**	**318**	**240**	**396**	**320**	**0**	**1840**	**44**	**3286**	**$ 497,660**	**$ 4,500**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 502,160**
13.1	Prepare Draft Design Drawings and Specifications at 30% Level of Completion		40	86	48	160	80		600	12	1026	$ 152,160	$ 1,000				$ -	**$ 153,160**
13.2	Prepare Draft Design Drawings and Specifications at 60% Level of Completion		32	80	60	100	100		600	12	984	$ 144,020	$ 1,000				$ -	**$ 145,020**
13.3	Prepare Draft Design Drawings and Specifications at 90% Level of Completion		32	120	100	80	100		520	12	964	$ 149,920	$ 1,000				$ -	**$ 150,920**
13.4	Prepare Draft Design Drawings and Specifications at 100% Level of Completion		24	32	32	56	40		120	8	312	$ 51,560	$ 1,500				$ -	**$ 53,060**
14.0	**Final Construction Bidding Documents Including Plans and Specifications**	**0**	**4**	**4**	**0**	**0**	**24**	**0**	**0**	**2**	**34**	**$ 5,900**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 5,900**
14.1	Prepare Final PS&E Package Including Final Signed and Stamped Plans and Specifications		4	4			24			2	34	$ 5,900					$ -	**$ 5,900**
15.0	**Construction Cost Estimate**	**0**	**4**	**8**	**32**	**0**	**0**	**0**	**0**	**1**	**45**	**$ 10,230**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 10,230**
15.1	Prepare and Submit a Construction Cost Estimate Prior to 100% Final Design		4	8	32					1	45	$ 10,230					$ -	**$ 10,230**
16.0	**Design Schedule and Estimated Construction Schedule**	**0**	**14**	**8**	**0**	**0**	**24**	**0**	**0**	**2**	**48**	**$ 9,360**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 9,360**
16.1	Prepare and Maintain a Detailed Design Schedule		6				12			1	19	$ 3,470					$ -	**$ 3,470**
16.2	Prepare and Maintain a Detailed Construction Schedule		8	8			12			1	29	$ 5,890					$ -	**$ 5,890**
17.0	**As-Built Plans**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**200**	**2**	**206**	**$ 24,220**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 24,220**
17.1	Prepare As-Built Plans That Describe the Final Constructed Project		4						200	2	206	$ 24,220					$ -	**$ 24,220**
18.0	**Construction Assistance**	**0**	**32**	**16**	**0**	**152**	**160**	**0**	**0**	**8**	**368**	**$ 64,120**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 64,120**
18.1	Review and Respond to Submittals/Shop Drawings (Assume 50 Submittals and Resubmittals)		16			120	120			4	260	$ 44,040					$ -	**$ 44,040**
18.2	Review and Respond to RFI's During Construction (Assume 30 RFI's)		16	16		32	40			4	108	$ 20,080					$ -	**$ 20,080**
TOTAL TASKS 1-18		**4**	**408**	**606**	**400**	**870**	**688**	**0**	**2,138**	**89**	**5,203**	**$ 853,070**	**$ 15,400**	**$ 20,000**	**$ 32,000**	**$ 10,000**	**$ 62,000**	**$ 930,470**

Fee Breakdown Schedule

OPTIONAL TASKS																		
19.0	**Construction Meetings**	**0**	**2**	**12**	**12**	**0**	**0**	**0**	**0**	**1**	**27**	**$ 6,190**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 6,190**
19.1	Attend a Pre-Bid and Pre-Construction Meeting		2	12	12					1	27	$ 6,190					$ -	$ 6,190
20.0	**Prepare Presentation Renderings**	**0**	**4**	**0**	**0**	**60**	**0**	**0**	**0**	**1**	**65**	**$ 11,610**	**$ -**	**$ 12,000**	**$ -**	**$ -**	**$ 12,000**	**$ 23,610**
20.1	Prepare Renderings for Public Outreach Meetings		4			60				1	65	$ 11,610		$ 12,000			$ 12,000	$ 23,610
21.0	**CFD Modeling**	**0**	**2**	**0**	**40**	**0**	**0**	**0**	**0**	**0**	**42**	**$ 9,500**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 9,500**
21.1	Prepare a CFD Model for the Reservoir		2		40						42	$ 9,500					$ -	$ 9,500
22.0	**Water Quality Analysis**	**0**	**12**	**24**	**40**	**0**	**40**	**40**	**0**	**2**	**158**	**$ 29,380**	**$ 1,000**	**$ 15,000**	**$ -**	**$ -**	**$ 15,000**	**$ 45,380**
22.1	Additional Water Quality Analysis for the Wells and Groundwater		12	24	40		40	40		2	158	$ 29,380	$ 1,000	$ 15,000			$ 15,000	$ 45,380
23.0	**Future Manganese Treatment**	**0**	**28**	**112**	**112**	**0**	**40**	**104**	**280**	**2**	**678**	**$ 111,220**	**$ 2,000**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 113,220**
23.1	Evaluation of Future Manganese Treatment into BODR		12	32	32			24	40	2	142	$ 25,820	$ 800				$ -	$ 26,620
23.2	Implement Future Manganese Treatment into Final Design		16	80	80		40	80	240		536	$ 85,400	$ 1,200				$ -	$ 86,600
24.0	**Potential Community Improvements**	**0**	**132**	**164**	**144**	**40**	**120**	**160**	**540**	**11**	**1311**	**$ 214,470**	**$ 3,800**	**$ 12,000**	**$ -**	**$ -**	**$ 12,000**	**$ 230,270**
24.1	Evaluate Community Improvements into BODR		8	20	40	40			80	1	189	$ 32,110	$ 1,000				$ -	$ 33,110
24.2	Modifications to Final Design to Implement Community Improvements		60	80	80		120	120	400	4	864	$ 132,840	$ 1,200				$ -	$ 134,040
24.3	Additional Project Management to Implement Community Improvements (Includes QA/QC)		40	40	24					4	108	$ 25,440	$ 600				$ -	$ 26,040
24.4	Additional Public Outreach Including Preparing Renderings to Implement Community Improvements		24	24				40	60	2	150	$ 24,080	$ 1,000	$ 12,000			$ 12,000	$ 37,080
TOTAL OPTIONAL TASKS 19-24		**0**	**180**	**312**	**348**	**100**	**200**	**304**	**820**	**17**	**2,281**	**$ 382,370**	**$ 6,800**	**$ 39,000**	**$ -**	**$ -**	**$ 39,000**	**$ 428,170**
TOTAL TASKS 1-24		**4**	**588**	**918**	**748**	**970**	**888**	**304**	**2,958**	**106**	**7,484**	**$ 1,235,440**	**$ 22,200**	**$ 59,000**	**$ 32,000**	**$ 10,000**	**$ 101,000**	**$ 1,358,640**
OPTIONAL TASKS 19-23		**0**	**48**	**148**	**204**	**60**	**80**	**144**	**280**	**6**	**970**	**$ 167,900**	**$ 3,000**	**$ 27,000**	**$ -**	**$ -**	**$ 27,000**	**$ 197,900**
TOTAL TASKS 1-23		**4**	**456**	**754**	**604**	**930**	**768**	**144**	**2,418**	**95**	**6,173**	**$ 1,020,970**	**$ 18,400**	**$ 47,000**	**$ 32,000**	**$ 10,000**	**$ 89,000**	**$ 1,128,370**

PAGE INTENTIONALLY BLANK

MWH®

300 North Lake Ave, Suite 400
Pasadena, CA 91101