Agenda Item No. A-4

DATE SUBMITTED	12/3/25	COUNCIL ACTION	(X)
		PUBLIC HEARING REQUIRED	( )
SUBMITTED BY	PUBLIC SERVICES	RESOLUTION	( )
		ORDINANCE 1ST READING	( )
DATE ACTION REQUIRED	12/17/25	ORDINANCE 2ND READING	( )
		CITY CLERK'S INITIALS	( )

IMPERIAL CITY COUNCIL
AGENDA ITEM

SUBJECT: DISCUSSION/ACTION:

Accept Proposal for final engineering for the influent pump station upgrade project from WEBB Associates; RFP 2025-18, CIP #851

BACKGROUND/SUMMARY:

See attached documentation

FISCAL IMPACT:

$395,760.00

Account: 54-851-5210 (CIP)

FINANCE INITIALS: VMS

STAFF RECOMMENDATION:

Staff recommends awarding the project to Webb & Associates

DEPT. INITIALS: JMG

MANAGER'S RECOMMENDATION:

approve

CITY MANAGER's INITIALS: DM

MOTION:

SECONDED:
AYES:
NAYES:
ABSENT:

APPROVED ( ) REJECTED ( )
DISAPPROVED ( ) DEFERRED ( )

REFERRED TO:

December 3, 2025

Dear Honorable Councilmembers:

Requested Action:

Accept Proposal for final engineering for the influent pump station upgrade project from WEBB Associates; RFP 2025-18

Background:

Public Services staff issued a public Request for Proposal (RFP) on October 7, 2025, to invite proposals from firms for final design and bid support for upgrades to the Influent Pump Station at the Imperial Wastewater Treatment Plant (WWTP). The improvements are based on the recommendations outlined in the Preliminary Engineering Report (PER) prepared by AQUA Engineering dated July 22, 2025.

The selected firm will be responsible for preparing the final construction documents, assisting with the bidding process, selecting the contractor, and providing construction support services.

The design services in this proposal include, but are not limited to, the following:

1. Project Management
2. Design Services
3. Bid Support

The final design by the consultant will typically follow the PER, but the consultant must ensure that the design includes new headworks screening, influent pumping, and odor scrubbing facilities that operate correctly. The final design will encompass, but is not limited to:

- Connection to the existing influent sewer collection system and diversion to the new headworks screens and influent pump station.
- New headworks screening and influent pump station structure and equipment.
- New odor control and foul air scrubber system.
- Connection to existing fine screens.
- Piping needed to finish the project.
- Site civil work, grading, paving, drainage, and demolition necessary to finish the project.
- Electrical, instrumentation, and SCADA equipment. SCADA programming is excluded from the scope of work. SCADA programming for the wastewater treatment plant is currently handled by SKM Engineering, located in Bountiful, Utah.

The city received two proposals. The fees are described below:

(1) WEBB Associates	**$395,760.00**
(2) TKE	$438,600.00

After a thorough review, staff recommends awarding the project to WEBB Associates. The preliminary engineering report (PER) estimated the final engineering and planning costs at $446,550.00.

Fiscal Impact:

Funds will be expended from wastewater enterprise funds. The project is accounted for in the FY 25-26 Capital Improvement Plan (CIP #851 - $400,000.00).

Attachments:

Preliminary Engineering Report dated July 22, 2025

Proposal from WEBB Associates dated November 6, 2025

ALBERT A WEBB ASSOCIATES

webbassociates.com

80th ANNIVERSARY

Proposal to Provide

FINAL ENGINEERING FOR THE INFLUENT PUMP STATION UPGRADE AT THE CITY OF IMPERIAL WASTEWATER TREATMENT PLANT

November 6, 2025

RFP 2025-18

Prepared for:
City of Imperial

3788 McCray Street
Riverside, CA 92506

951.686.1070

Table of Contents

1. LETTER OF TRANSMITTAL

November 6, 2025

ALBERT A. WEBB ASSOCIATES

Jenell Guerrero
Public Services Manager
City of Imperial
420 S. Imperial Avenue
Imperial, CA 92251

RE: PROPOSAL FOR FINAL ENGINEERING FOR THE INFLUENT PUMP STATION UPGRADE AT THE CITY OF IMPERIAL WASTEWATER TREATMENT PLANT (RFP 2025-18)

Dear Ms. Guerrero:

The existing Influent Pump Station (IPS) represents a bottleneck to the future flow capacity of the City's Wastewater Treatment Plant (Plant). The Influent Pump Station and Headworks Upgrade Project is a critical opportunity to significantly improve Plant performance and operational reliability. This project will:

- Add coarse screening to reduce wear and impacts on downstream processes
- Improve pumping capacity and equipment maintainability
- Reduce corrosivity of Plant influent and extend the life of Plant infrastructure

The same team that delivered the MBR project and prepared the Preliminary Engineering Report (PER) for this upgrade will bring unmatched expertise to final design. Our team's approach is built on three key strengths:

Unmatched Institutional Knowledge and Continuity
WEBB has been the City of Imperial's trusted engineering partner since 2006. No other firm can match our deep understanding of the Plant's infrastructure, operations, and unique challenges. This continuity ensures a minimal learning curve, saving time and reducing risk. As the authors of the PER and the recommended Option 2 Dry-Pit Pump configuration, our team is ready to begin work immediately.

Proven Expertise in Managing Complex Projects
From deep-structure groundwater mitigation to live flow conversions, our engineers excel at solving the technical challenges this project presents. We will implement a methodical construction sequencing plan with reliable bypass pumping and proactive groundwater management to maintain operations throughout construction.

Integrated, Future-Focused Solutions
Our approach prioritizes reliability, sustainability, and scalability. By integrating advanced electrical systems, corrosion protection measures, and allowances for future capacity expansion, we will deliver infrastructure that serves the City's immediate needs while positioning it for future growth.

Albert A. Webb Associates (WEBB) has thoroughly examined and is fully familiar with the work required under this RFP. We are confident in our ability to perform quality work that meets the City's objectives and maintains the highest professional standards.

Our proposed lump sum fixed fee of ***$395,760*** reflects a complete scope of services as defined in Section IV of the RFP. All information submitted in this proposal is true and correct to the best of our knowledge.

Thank you for the opportunity to continue serving the City of Imperial. We look forward to partnering once again to deliver a thoughtfully planned and expertly executed project that enhances reliability, efficiency, and long-term sustainability of the City's wastewater system. Please feel free to contact me with any questions.

This proposal shall remain valid for a period of not less than ninety (90) days from the date of submittal.

Sincerely,

Brian Knoll, PE
Chief Operations Officer
brian.knoll@webbassociates.com
951.830.3389
Albert A. Webb Associates
3788 McCray Street
Riverside, CA 92506
(951) 686-1070 | www.webbassociates.com

2. FIRM STRUCTURE AND HISTORY

WEBB Overview

Albert A. Webb Associates (WEBB) has been a trusted provider of civil engineering services to public sector clients across California since 1945. Our longevity reflects a foundation of financial stability and adaptability through decades of evolving economic landscapes. As a mid-sized consulting firm with offices in Riverside and Murrieta, WEBB is strategically positioned to serve the diverse needs of our clients effectively.

We offer comprehensive in-house professional services, bringing decades of experience to public and private sector clients throughout Inland Southern California. Our team specializes in addressing the unique challenges faced by cities, water and special districts, counties, regional agencies, and industry partners. From project development and planning to design, entitlement, funding assistance, permitting, construction management, and inspection, our services span the entire project lifecycle.

WEBB's enduring legacy, financial strength, and dedicated team of experts make us the preferred partner for public sector entities in California. We are committed to delivering excellence, ensuring the success of every project, and fostering lasting professional partnerships.

POINT OF CONTACT

Brian Knoll, PE
Chief Operations Officer
brian.knoll@webbassociates.com
951.830.3389

Engineering & Planning Excellence Since 1945

WEBB offers the following services:

- Construction Management & Inspection
- Environmental Services
- Land Development Engineering
- Land Development Planning & Entitlement
- Land Survey & Mapping
- Landscape Architecture
- Traffic & Transportation
- Water Resources

Learn more by visiting
webbassociates.com/services

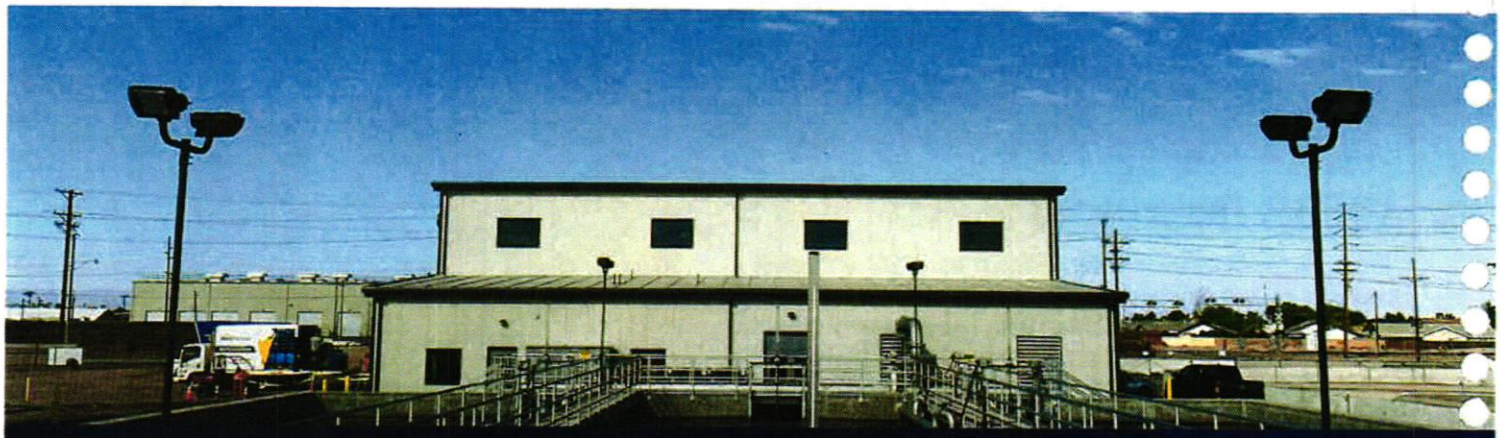
Corporate Headquarters
3788 McCray Street
Riverside, CA 92506
951.686.1070

80th ANNIVERSARY

190+ Associates

40+ Licensed Professionals

Project Experience



2.4-MGD WASTEWATER TREATMENT PLANT EXPANSION

City of Imperial

Faced with increasing demands on its aging wastewater infrastructure, the City of Imperial needed a comprehensive solution to expand its treatment capacity while modernizing outdated systems. The existing plant required critical upgrades to meet regulatory requirements and support the city's growth. WEBB led the project from start to finish, taking responsibility for preliminary engineering, environmental documentation and compliance (CEQA), survey and mapping, final design, bidding, construction management, inspection, and NPDES permitting.

To address the city's needs, WEBB began by evaluating the existing facility and preparing a facility master plan to guide improvements. The design included a new headworks screening system, an activated sludge extended aeration basin, and a membrane bioreactor (MBR) treatment system to improve biological treatment capacity and performance. A new ultraviolet (UV) disinfection system replaced the older method to provide more effective, chemical-free pathogen removal. Additionally, sludge dewatering screw presses were added to improve solids handling, and a complete new SCADA system was designed to provide automated monitoring and control of plant operations. The project scope also includes electrical and controls upgrades, flow monitoring and sampling systems, and all related process and yard piping. Through these improvements, WEBB delivered a modern, efficient, and fully compliant treatment facility that will serve the City of Imperial for decades to come, while supporting the city in securing funding for project implementation.

Project Highlights

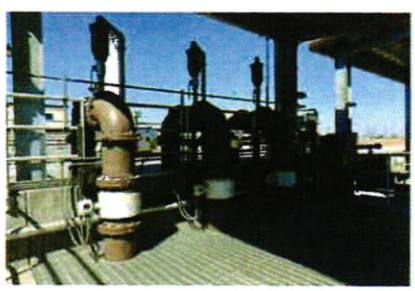
Reference:
Christopher Kemp
Chief Wastewater Operator
420 South Imperial Avenue Imperial, CA 92251
ckemp@cityofimperial.org
760.457.5772

Duration:
2018 - 2022

WEBB Contract:
$2 M

Construction Cost:
$21 M

Project Team:
Shane Bloomfield, PE
Brian Knoll, PE
Justin Logan, PE - AQUA
Mark Jeppsen, EE - SKM
Christina Nishimoto, PE, SE - Kleinfelder



1.0-MGD WASTEWATER TREATMENT PLANT EXPANSION

City of Imperial

WEBB had responsibility for all aspects of the project including preliminary engineering, environmental documentation and compliance, survey and mapping, final facility design, bidding, construction management, inspection, and NPDES permitting. The upgrades to the City's existing facility included the design of new headworks screening units, addition of an activated sludge extended aeration basin (Biolac), reinforced concrete secondary clarifiers, blower building and blower units, upgraded UV disinfection system (Trojan 3000 Plus), sludge drying beds and sludge staging area, flow monitoring and sampling, electrical and controls upgrades, and all appurtenant process and yard piping.

Project Similarities

- Existing operating facility, structures, and piping
- Evaluate existing facilities and prepare facility master plan
- Upgrade/expand headworks
- Upgrade/expand biological treatment
- Add secondary clarifier
- New UV disinfection
- Add dewatering drying beds
- Funding assistance
- CEQA
- Biolac Treatment System

Project Highlights

Reference:
Christopher Kemp
Chief Wastewater Operator
420 South Imperial Avenue
Imperial, CA 92251
ckemp@cityofimperial.org
760.457.5772

Duration:
2006 - 2008

WEBB Contract:
$700,000

Construction Cost:
$6 M

Project Team:
Brian Knoll, PE
Shane Bloomfield, PE

B STREET LIFT STATION UPGRADE

City of Imperial

The "B" Street Lift Station was originally constructed as a submersible pump lift station with pumps 20-FT below the ground surface. These pumps consistently clogged and required excessive maintenance. The lift station was also a constant odor problem for the City. This project constructed a dry pit adjacent to the existing wet well with new non-clog Gorman-Rupp sewage pumps. In addition, the project included oxygenation equipment to reduce odors, new shade structures, and upgraded electrical systems. WEBB also provided construction management and inspections services for this project.

Applicable Issues:

- Wet Well Dry Pit
- Odor Controls
- Bypassing plan of Existing Flows

Project Highlights

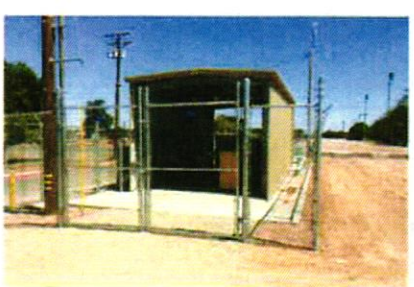
Reference:
Christopher Kemp
Chief Wastewater Operator
420 South Imperial Avenue Imperial, CA 92251
ckemp@cityofimperial.org
760.457.5772

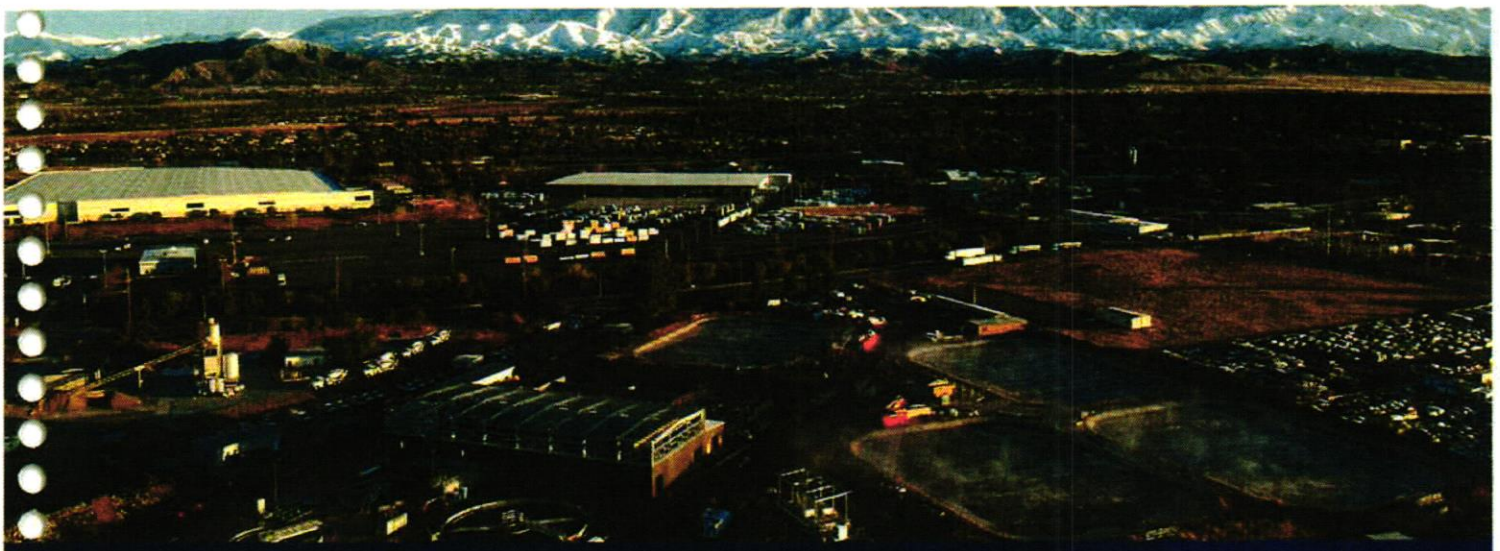
Duration:
2015 - 2016

WEBB Contract:
$70,000

Construction Cost:
$1.3 M

Project Team:
Shane Bloomfield, PE
Brian Knoll, PE





WASTEWATER TREATMENT PLANT UPGRADE AND EXPANSION AND BRINE LINE DESIGN

City of Beaumont

WWTP Expansion and Upgrade

The City of Beaumont's existing Wastewater Treatment Plant (WWTP) was operating at over 75% of its permitted capacity, signaling an urgent need for expansion to accommodate future growth and maintain regulatory compliance. Compounding this challenge was a new mandate from the Regional Water Quality Control Board's updated Basin Plan, which required a significant reduction in Total Dissolved Solids (TDS) discharged from the facility. To address these issues, WEBB conducted a comprehensive feasibility study to determine the most effective strategy for expanding and upgrading the WWTP. The resulting solution included modernizing and enhancing key treatment processes such as headworks screening, flow equalization, grit removal, fine screening, membrane bioreactors (MBR), reverse osmosis, biosolids dewatering, and drying, bringing the facility up to a 6 MGD capacity. These upgrades ensure long-term operational efficiency while meeting critical environmental standards for water quality and reuse.

Brine Line – Final Design

One of the most critical challenges in the WWTP upgrade was safely and sustainably disposing of the high-salinity brine generated by the new treatment processes. Without a reliable brine disposal solution, the project's compliance with the Basin Plan would not be possible. WEBB's feasibility study identified the Inland Empire Brine Line (IEBL) as the most viable and cost-effective option for brine disposal. WEBB is now leading the final design of a 12-inch, 23-mile pipeline that will convey brine from the City's WWTP to the IEBL connection near the City of San Bernardino's WWTP on Waterman Avenue. In addition to engineering the pipeline, WEBB is coordinating and managing permitting efforts across multiple jurisdictions, including Riverside and San Bernardino Counties, and the Cities of Redlands, Loma Linda, and San Bernardino, ensuring a collaborative, streamlined path to construction and regulatory approval.

Project Highlights

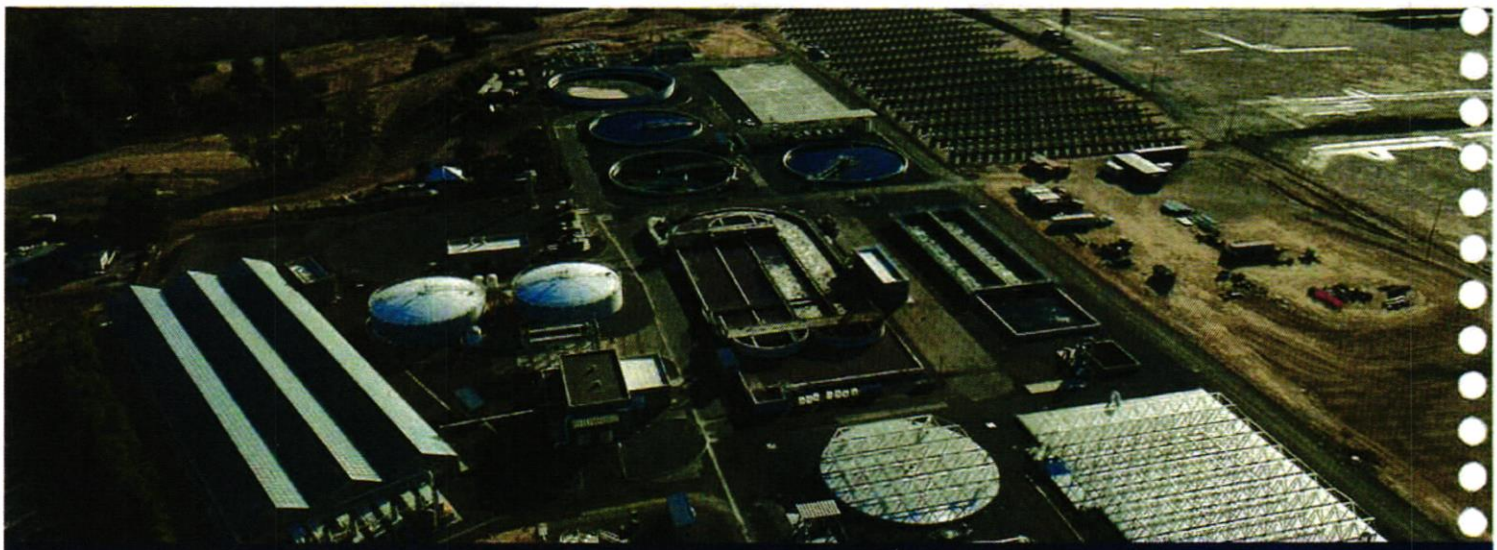
Reference:
Thaxton Van Belle
General Manager, Utilities
550 East 6th Street Beaumont, CA 92223
tvanbelle@beaumontca.gov
951.572.3195

Duration:
2016 - 2018

WEBB Contract:
$6 M

Construction Cost:
$90 M

Project Team:
Shane Bloomfield, PE
Brian Knoll, PE
Justin Logan, PE - AQUA
Boris Petkovic, PE - AQUA
Mark Jeppsen, PE - SKM
Christina Nishimoto, PE, SE - Kleinfelder



14-MGD WASTEWATER TREATMENT PLANT EXPANSION

Western Riverside County Regional Wastewater Authority

Originally built in 1998 with a design capacity of 8.0 million gallons per day (MGD), the Western Riverside County Regional Wastewater Authority (WRCRWA) Treatment Plant was facing growing demand from its member agencies due to rapid development across the service area. With the existing facility nearing capacity, additional treatment capability was urgently needed to support future growth and ensure continued compliance with regulatory requirements. WEBB was selected to lead the expansion, increasing the plant's capacity to 14 MGD while maintaining operational efficiency and cost control.

WEBB began by evaluating various design alternatives to expand flow and biological capacity without significantly increasing treatment costs. Through close collaboration with WRCRWA and its member agencies, the team selected cost-effective solutions that balanced performance, budget, and long-term sustainability. The final design encompassed improvements across all treatment phases, primary, secondary, and tertiary, as well as advanced disinfection, solids handling, and infrastructure upgrades. WEBB's design also incorporated modernized control systems, chemical storage and pumping facilities, and odor mitigation features to support performance and community impacts. The result was a future-ready facility that met the region's growing needs and delivered recycled water as a sustainable resource.

Project Highlights:

- Planned, designed, and programmed a complete new SCADA system
- Headworks screening improvements
- Enhanced biological treatment
- Anaerobic digestion
- Tertiary filtration
- Sludge dewatering and drying systems
- Chemical storage and pumping
- Odor control facilities
- Equalization (EQ) basin and pump station
- Covered primary clarifiers
- New chlorine contact basin
- Recycled water production capabilities

Project Highlights

Reference:

Tony Pollak
Assistant Deputy Director of Operations
16451 El Sobrante Road Riverside, CA 92503
tpollak@wmwd.com
951.789.5114

Duration:

2013 - 2017

WEBB Contract:

$3.6 M

Construction Cost:

$61 M

Project Team:

Brian Knoll, PE
Shane Bloomfield, PE
Justin Logan, PE - AQUA
Boris Petkovic, PE - AQUA
Mark Jeppsen, PE - SKM
Christina Nishimoto, PE, SE - Kleinfelder

WATER RECLAMATION FACILITY #1 SLUDGE STORAGE PROJECT

City of Corona

At the City's Water Reclamation Facility (WRF) #1, the existing sludge storage setup, where primary and secondary sludges were mixed in a single tank, was causing operational challenges. The combined sludge, high in phosphorus, contributed to significant struvite buildup in the dewatering systems, impacting overall efficiency. The City turned to WEBB to help reimagine and optimize the storage process to address this. Leveraging existing infrastructure, WEBB repurposed an old, abandoned chlorine contact basin into a two-cell sludge holding tank, separating the sludges and integrating an aeration and mixing system to improve sludge quality before dewatering. The team also replaced outdated strain presses with two new rotary drum screens to ensure more effective screening. A new transfer pump station was designed and constructed to move the separated sludge to the gravity belt thickener and centrifuges. In addition to these process upgrades, WEBB oversaw relocating existing sludge and dewatering motor control centers (MCCs) into a new powerhouse electrical building. All of this work was completed while the facility remained fully operational. WEBB closely coordinated with the City's Operations Staff, carefully planning each piping and electrical cutover to avoid service interruptions and ensure a seamless transition to a more efficient and reliable sludge management system.

Project Highlights

Reference:
Mauro Casas
Chief Water Reclamation Officer
400 South Vicentia Avenue, Suite 320 Corona, CA 92882
mauro.casas@coronaca.gov
951.739.4817

Duration:
2019 - 2021

WEBB Contract:
$500,000

Construction Cost:
$3 M

Project Team:
Brian Knoll, PE
Justin Logan, PE - AQUA
Boris Petkovic, PE - AQUA
Mark Jeppsen, PE - SKM
Che Tang, PE -Tang Structural Engineers

Firm Organizational Chart

ALBERT A. WEBB ASSOCIATES

BOARD OF DIRECTORS

President/CEO
Matthew Webb, PE, TE, LLS

Secretary
Scott Webb

Director of Risk Management/Board Member
Steve Webb

Board Member
Sandra Webb

EXECUTIVE MANAGEMENT

Chief Operations Officer
Brian Knoll, PE

Chief Development Officer
Kevin W.M. Ferguson

Chief Strategy Officer
Scott Hildebrandt, PE

Chief Financial Officer
Todd Smith

PRINCIPAL PARTIES & AUTUHORIZED AGENTS

Senior Vice President
Bruce Davis, PE
Water Resources

Vice President
Stephanie Standerfer
Environmental Services

Senior Vice President
Dilesh Sheth, PE, TE
Traffic & Transportation

Director
Jennifer Gilllen, PE, QSP, QSD
Land Development Engineering

Director
Reed Chilton
Construction Management & Inspection
Land Survey & Mapping

Director
Sandy Chandler
Land Development & Entitlement

Vice President
Jason Ardery, PE, TE, LLS, CPESC, QSD
Land Survey & Mapping

Water Resources Practice Leader
Joseph Caldwell, PE, CPSWQ, CPESC, QSD, QSP, CFM
Water Resources

3. KEY PERSONNEL

Project Team

Knowledge, experience, and responsiveness are essential to delivering the high-performing infrastructure the City of Imperial expects from this critical project. WEBB's Water Resources Engineering team embodies these qualities—bringing the technical depth, coordination skills, and proven experience necessary to exceed the City's goals. Our team is equipped to manage multiple design components simultaneously while aligning specialized expertise to each task. This approach ensures efficient execution, rapid response to City needs, and a streamlined path to project completion.

PRINCIPAL IN CHARGE

Brian Knoll, PE
Chief Operations Officer

PROJECT MANAGER

Shane Bloomfield, PE
Senior Engineer

ENGINEERING SUPPORT

CIVIL DESIGN

Tyler Vigneault, PE
Associate Engineer

INTEGRATED PARTNERS

WASTEWATER PROCESS DESIGN

AQUA

Process Lead
Justin Logan, PE
Principal

Design Engineer
Boris Petkovic, PE
Principal

Mitchell Weldon, PE
Project Engineer

ELECTRICAL/SCADA

SKM

Electrical Lead
Mark Jeppsen, EE
Principal Engineer

Design Engineer
Robert Martinez
Project Engineer

STRUCTURAL ENGINEERING

Kleinfelder

Structural Design Lead
Eric Ng, PE, SE
Principal in Charge

Design Engineer
Christina Nishimoto, PE, SE
Senior Engineer

SUBCONULSTANTS

GEOTECHNICAL ANALYSIS

LandMark

LAND SURVEY

The Holt Group

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BRIAN KNOLL, PE

CHIEF OPERATIONS OFFICER

Brian Knoll, PE, is WEBB's Chief Operations Officer, leading a multi-disciplinary team of eight services. He has been responsible for the design and direction of capital improvement projects throughout Southern California. With a focus on water and wastewater infrastructure, Brian brings over two decades of experience in the planning, design, and construction oversight of complex public works projects.

He has led numerous large-scale, multidisciplinary efforts, including the City of Riverside's 26-MGD Water Quality Control Plant expansion, the City of Beaumont's advanced water treatment facility and brine line, and the 14-MGD expansion of the Western Riverside Wastewater Treatment Plant. His collaborative approach and deep technical knowledge have supported successful outcomes for agencies such as the City of Imperial, Western Municipal Water District, Golden State Water Company, Eastern Municipal Water District, and WRCRWA.

A respected leader in the water resources sector, Brian has also partnered with industry leaders like CDM Smith, Black & Veatch, and CH2M Hill. His strategic perspective, technical expertise, and practical approach continue to elevate WEBB's operational excellence and reputation in the industry.

EXPERIENCE:
Industry: 24 Years
WEBB: 24 Years

REGISTRATIONS:
Civil Engineering C 65690 CA
Civil Engineering C 42407 AZ

EDUCATION:
MS, Civil Engineering
Brigham Young University
BS, Civil Engineering
Brigham Young University

AFFILIATIONS:
American Water Works Association
American Society of Civil Engineers
Water Environment Federation

PROJECT EXPERIENCE:

2.4-MGD Wastewater Treatment Plant Expansion
City of Imperial | Project Manager
Brian served as Project Manager and Engineer of Record, overseeing the entire project lifecycle from preliminary design through construction support. He oversaw efforts related to environmental compliance, equipment selection, SCADA integration, and SRF funding coordination. Under his leadership, the project delivered advanced treatment capabilities, including MBR technology, UV disinfection, and sludge dewatering, tailored to the city's long-term operational goals.

Water Reclamation Facility #1 Sludge Storage Project
City of Corona | Principal in Charge
As Principal in Charge, Brian led the planning and design of sludge handling improvements at WRF #1. He oversaw the conversion of an abandoned chlorine contact basin into a two-cell aerated sludge holding tank, the replacement of strain presses with rotary drum screens and the development of a new transfer pump station. Brian also directed the relocation of existing MCCs to a new powerhouse electrical building and worked closely with operations staff to coordinate critical cutovers without disrupting facility operations.

Water Reclamation Facility #2 Motor Control Center Replacement Project
City of Corona | Principal in Charge
As Principal in Charge, Brian provided strategic oversight for designing and coordinating MCC replacements at the City's WRF #2. He guided design coordination for critical electrical upgrades at facilities such as the Sunkist Lift Station and Aeration Basin, ensuring uninterrupted plant operations. Brian played a key role in the planning of new E-Houses, power and control system rerouting, and pre-purchase strategies to address long lead equipment timelines, all while aligning with City standards and supporting phased implementation efforts.

Water Reclamation Facility #1 Centrifuge Phase 2 Expansion
City of Corona Department of Water and Power | Principal in Charge
As Principal in Charge, Brian led all phases of the planning, designing, and implementation of a major biosolids dewatering upgrade at WRF #1. He oversaw the replacement of an aging belt press with a high-performance Alfa Laval centrifuge, significantly improving solids concentration and reducing operational costs. Brian's leadership ensured seamless integration with existing systems, continuous plant operation, and strategic layout planning for future upgrades. His close coordination with the City and equipment vendors helped maintain warranty protections and streamline installation.

Wastewater Treatment Plant Upgrade and Expansion and Brine Line Design
City of Beaumont | Principal in Charge
As Principal in Charge, Brian Knoll led the dual-phase effort to expand and upgrade the City of Beaumont's wastewater treatment plant and design a 23-mile brine line connection to the Inland Empire Brine Line (IEBL). He oversaw a detailed feasibility study and guided the implementation of advanced treatment technologies, including MBR, reverse osmosis, and biosolids handling systems, to increase capacity and meet updated Basin Plan regulations. Brian also managed permitting and coordination across multiple jurisdictions for the brine line, ensuring regulatory compliance and long-term infrastructure reliability.

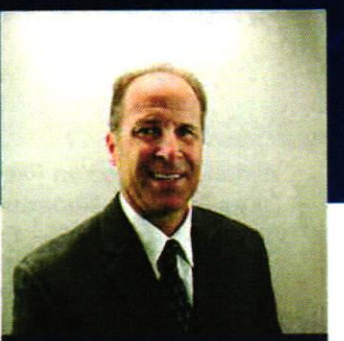
Calipatria Water Treatment Plant Reservoirs and Booster Pump Station
Golden State Water Company | Project Manager
As Project Manager, Brian Knoll led the Calipatria Water Treatment Plant upgrade to increase capacity and meet state and federal drinking water standards. He oversaw planning, design, environmental compliance, and construction coordination for key improvements, including new treatment trains, booster stations, reservoirs, a GAC adsorption system, and chemical feed facilities. Brian worked closely with Golden State Water Company to meet water quality and operational goals and supported regulatory approvals through the CDPH acceptance process and PUC rate case hearings.

Temecula Water Reclamation Facility 23-MGD Expansion
Eastern Municipal Water District | Principal in Charge
As Principal in Charge, Brian Knoll led the civil design efforts for Eastern Municipal Water District's 23 MGD expansion of the Temecula WRF in partnership with CH2M Hill. He oversaw site layout, grading, yard piping, and utility relocations to support the integration of new treatment facilities, including headworks, membrane bioreactor systems, a chlorine contact basin, and chemical storage and feed systems.

14-MGD Wastewater Treatment Plant Expansion
Western Riverside County Regional Wastewater Authority | Project Manager
As Project Manager, Brian led the design of the 14-MGD plant expansion, working closely with member agencies to evaluate treatment alternatives and deliver cost-effective solutions. He guided key design decisions involving primary, secondary, and tertiary treatment processes, disinfection, solids handling, and chemical systems. His leadership ensured the project balanced technical performance with long-term affordability and operational efficiency.

SHANE BLOOMFIELD, PE

SENIOR ENGINEER | WATER RESOURCES



Shane Bloomfield, PE, is a Senior Engineer with WEBB's Water Resources Department. Shane specializes in designing public works projects consisting of major pumping plants, groundwater pumping wells, sewer collection system design, wet well rehabilitation, water distribution system design, wastewater treatment plant design, and hydraulic system modeling using various computer models. He has engineering design responsibilities for several projects for public works agency clients, including the City of Ontario, the City of Riverside, Jurupa Community Services District, Eastern Municipal Water District, Coachella Valley Water District, and Crestline-Lake Arrowhead Water Agency.

EXPERIENCE:
Industry: 24 Years
WEBB: 24 Years

REGISTRATIONS:
Civil Engineer C 77435 CA

EDUCATION:
BS, Geology/Hydrology
Brigham Young University
MS, Environmental Science & Engineering
Colorado School of Mines

AFFILIATIONS:
National Groundwater Association

PROJECT EXPERIENCE:

2.4-MGD Wastewater Treatment Plant Expansion
City of Imperial | Assistant Project Manager
Shane served as Assistant Project Manager and lead design engineer for the City of Imperial Wastewater Treatment Plant Upgrade. He was assisted in the development and coordination of detailed design plans for key project components, including the sewer pipeline infrastructure and process integration with new treatment technologies. Shane worked closely with the City, subconsultants, and the project team to ensure constructability, cost-efficiency, and compliance with regulatory requirements. His contributions supported the successful implementation of advanced treatment features such as the membrane bioreactor (MBR) system, UV disinfection, sludge dewatering, and SCADA integration, all of which were critical to meeting the City's goals for recycled water use and long-term operational reliability.

Claypool Lift Station and Force Main
City of Imperial | Project Engineer
Shane served as a Project Engineer for the replacement of the Claypool Lift Station and new associated force main. The City was experiencing reduced pumping capabilities in a damaged portion of force main that required the replacement of an existing pump station and the installation of a new force main. The project included the removal of the existing pump station, installation of two new pumps with controls, and the installation of 3,100-LF of 8-inch diameter PVC force main.

Replacement of Two Lift Station Pumps - Gateway of the Americas, Sewer Lift Station No. 2
Imperial County Department of Public Works | Project Manager
Shane served as the Project Manager for the replacement of two 5-hp submersible sewage pumping units for ICDPW's Lift Station No. 2. Project specifications included the replacements of equipment and pump appurtenances systems, pump guide rail system (to support three pumps), level control system, and all hardware inside the wet well, replacement of motor control center, and electrical wiring.

Wastewater Treatment Plant Upgrade and Expansion and Brine Line Design
City of Beaumont | Project Engineer
Shane prepared the feasibility study, which analyzed two options. The first was the Beaumont option, which expanded and upgraded treatment at the City's WWTP. The second option was to consolidate treatment with YVWD and deliver all wastewater flow there. Detailed cost estimates were developed for each option, considering capital and O&M costs.

Water Reclamation Facility #1 Centrifuge Phase 2 Expansion
City of Corona Department of Water and Power | Project Engineer
Shane served as the Site and Mechanical Design Lead for the City of Corona's WRF #1 Centrifuge Replacement Project. Shane played a pivotal role in developing the facility layout, mechanical connections, and structural integration of the new centrifuge into the existing dewatering building. He worked closely with the design team and City staff to ensure seamless installation while one belt press remained in operation. Shane's design approach considered current operations and anticipated future expansion, incorporating flexibility into the support system and optimizing space for a second centrifuge. His attention to constructability and coordination with multiple disciplines helped maintain project momentum, reduce operational disruptions, and enhance long-term functionality.

Water Reclamation Facility #2 Motor Control Center Replacement Project
City of Corona | Project Engineer
Shane was responsible for civil site planning and utility locating for the MCC replacement project. He provided engineering support to ensure the successful integration of new electrical infrastructure within the existing treatment facility. Shane brought extensive experience in civil engineering design and construction coordination, with a strong focus on maintaining operational continuity during infrastructure upgrades.

Lakeside Lift Station
Jurupa Community Services District | Project Manager
Shane served as a Project manager for the recommissioning of the Lakeside Lift Station. The Lakeside Lift Station and force main was decommissioned by the District when the Indian Hills Wastewater Reclamation Plant "Plant 2" was abandoned. The lift station had an 8-inch diameter overflow connection within its wet well structure. Wastewater within the wet well surcharged and flowed into the overflow connection which outlet into a 12-inch diameter gravity main on Limonite Avenue, also known as the "Plant 2 Overflow Line". Final evaluation indicated re-commissioning the station was feasible and cost effective. The design project consisted of preparing plans and specifications to re-commission the sewer lift station by removing the existing mechanical and electrical equipment and replace it with new equipment, including a new electrical service and vactor truck turnout.

TYLER VIGNEAULT, PE

ASSOCIATE ENGINEER I WATER RESOURCES

Tyler Vigneault is an Associate Engineer with WEBB's Water Resources Department. Tyler offers clients extensive experience managing the design and construction of a wide range of public works projects that enhance water quality and supply, including water and wastewater systems, water reclamation, and water and wastewater treatment.

EXPERIENCE:
Industry: 7 Years
WEBB: 5 Years

REGISTRATIONS:
Civil Engineer C 98236 CA

EDUCATION:
BS, Civil Engineering, Environmental Option
California Polytechnic State University Pomona

PROJECT EXPERIENCE:

Well 53 Drilling and Equipping
City of Ontario - Municipal Utilities Department | Project Engineer
Tyler supported the preparation of plans, specifications, and cost estimates for Well No. 53. He assisted with utility research, document production, and design coordination throughout the development of the equipping plans.

Wells 7A and 8
Morongo Band of Mission Indians | Assistant Engineer
Tyler supported the preparation of engineering plans, technical specifications, and construction documents for the equipping phase for Well 7 and 8. Tyler contributed to the development of the Preliminary Design Report (PDR), site layout coordination, pipeline alignments, and equipment integration including pumps, disinfection systems, and standby power units. Tyler provided drafting support, assisted with utility research, and helped coordinate inputs from subconsultants, including SCADA and electrical design led by Design West Engineering. He also supported QA/QC efforts at key design milestones and was involved in assembling bid packages, reviewing submittals, and preparing record drawings during the construction phase.

Well 43 Wellhead Equipping
City of Ontario, Municipal Utilities Department | Assistant Engineer
Tyler served as Assistant Engineer on the equipping of Well No. 43 for the City of Ontario. This project included pump (2,500 GPM to 3,500 GPM) and motor sizing (350 hp to 800 hp), emergency generator sizing, on-site chlorine generation system sizing, preparation of all civil, and mechanical, and coordination of the electrical drawings, and preparation of bid documents and technical specifications.

Well 22 Wellhead Equipping
Yorba Linda Water District | Assistant Engineer
WEBB is providing engineering design, bid support, and construction support services for Wellhead Equipping Well No. 22. The discharge piping will exit the site west through Fee Ana Street, then back into OCWD property, then due west along the north side of the Huckleberry Basin to Richfield Road, where it will then traverse north to the connection point to the existing 20-inch diameter transmission main at the northeast corner of Conrock Basin. The District has coordinated with OCWD on the well pump-to-waste line and discharge structure (headwall and rip-rap) into the Huckleberry Basin, and the water level may be lowered 5-FT to allow for the installation of the pump-to-waste structure. The District anticipates a production yield of 2,500 GPM, and the design will follow the layout of the recently completed Well No. 21 located west of the Well No. 22 site. The discharge waterline will be adjacent to the OCWD Basin to Richfield Road and must maintain access during construction.

Dale Kiler Water Main Replacement)
Coachella Valley Water District | Assistant Engineer
Tyler served as the assistant engineer during the Dale Kiler/North Shore Waterline Replacement construction, provided engineering support during construction, and provided the vertical profile modifications based on the Contractor's pothole data.

Well II-12 Equipping

Chino Basin Desalter Authority | Assistant Engineer

Tyler served as an Assistant Engineer for Well II-12, located on a parcel of land within the Chino Desalter well field, as part of the Phase 3 Expansion. The water supply transferred from the Chino I Desalter well field to the Chino II Desalter well field.

Justin R. Logan, PE | Principal

Phone: 801.694.4604 | **Email:** justin.logan@aquaeng.com

As Vice President and Principal, Mr. Logan leads our firm's water and wastewater treatment initiatives. He specializes in the comprehensive planning, design, and construction of treatment facilities. Justin's approach centers on delivering effective and affordable solutions tailored to each client's unique challenges. Having contributed to over 50 treatment facilities, he brings extensive experience with diverse processes and equipment. His responsibilities encompass project master planning, facility evaluations, process development, design layout, plant configuration, design efficiency, and the development of construction drawings for both water and wastewater treatment facilities.

Project Experience

City of Beaumont Water Reclamation Facility Upgrade - Beaumont, CA
Principal/Project Manager | Existing plant modification and expansion from extended aeration to a 6.0 mgd membrane bioreactor (MBR) plant followed by reverse osmosis to meet salt reduction requirements. The upgrade includes headworks, secondary treatment, tertiary treatment, solids handling and drying.

City of Imperial Wastewater Treatment Plant Upgrade - Imperial, CA
Principal/Project Manager | Conversion of existing plant form extended aeration to a 2.4 mgd membrane bioreactor (MBR) plant capable of producing recycled water.

Western Riverside County Regional Water Authority - Corona, CA
Principal/Project Manager | Plant evaluation, design, and construction services for a complete plant upgrade from 8 mgd to 14 mgd, including all aspects of the treatment plant.

Western Riverside County Regional Water Authority - Corona, CA
Principal/Project Manager | Aeration upgrade adding diffusers and blowers to existing process to improve efficiency and restore capacity of oxidation ditch.

City of Corona Dewatering Upgrade - Corona, CA
Principal/Project Manager | Modification of existing dewatering belt press facility to include a single centrifuge capable of dewatering for the plant and also capable of adding another centrifuge in the future.

Las Gallinas Valley Sanitary District Secondary Treatment Upgrade - San Rafael, CA
Principal/Project Manager | Planning, Design and Construction Management work for the upgrade of the secondary treatment processes from trickling filter to activated sludge, including equalization basin addition and recycled water facility expansion.

Las Gallinas Valley Sanitary District Recycled Water Facility - San Rafael, CA
Principal/Project Manager | Design and construction services for the addition of the Recycled Water facility to the existing treatment plant. This 1.4 mgd facility, capable to 5.4 mgd, utilizes pressure membranes and UV treatment.

City of Imperial Headworks Upgrade - Imperial, CA
Principal/Project Manager | Replacement of existing headworks facility along with various other plant improvements.

Puako Preliminary Engineering Report - Puako, HI
Principal/Project Manager | Preliminary feasibility of treatment & sewer collection options for the Community of Puako with the preparation of a Preliminary Engineering Report.

Fort Shafter Flats Pump Station Conversion - Honolulu, HI
Principal/Project Manager | Planning and complete design for the conversion of the existing pump station to a 2 mgd membrane facility to produce recycled water.

City of Rexburg Water Reclamation Facility Solids Handling Project - Rexburg, ID
Principal/Project Manager | Expansion of solids handling process by converting to anaerobic digestion and pasteurization to produce Class A biosolids and provide for solids storage.

Education

BS Civil & Environmental Engineering, Brigham Young University, 1998

MS Civil & Environmental Engineering, Brigham Young University, 1999

Registration

Professional Engineer:

Utah, Nevada, Arizona, California, New Mexico, Hawaii, Idaho, Colorado

Work Experience

27 Years

Affiliations

WEF

WEAU

WEFTA

ASCE

Expertise

- Wastewater Treatment
- Pump Stations
- Water Storage
- Flood Control & Drainage
- Mechanical Installations

Justin R. Logan, PE | Principal

Project Experience (continued)

Rexburg City Wastewater Treatment Plant - Rexburg, ID
Principal/Project Manager | Expansion and upgrade utilizing a fixed film process followed by existing oxidation ditches to bring the plant to capacity of 4.8 mgd, adding ultraviolet disinfection, and belt press facility.

Tooele City Water Reclamation Facility, Phase 1B Upgrade - Tooele, UT
Design and construction which added UV disinfection, digestion, and solar drying to the facility. Expansion and upgrade utilizing an MBR process to bring the plant to a capacity of 2 mgd.

Elko Secondary Treatment Upgrade - Elko, NV
Facility planning, design, and construction of a 4 mgd plant.

West Wendover Wastewater Treatment Plant - West Wendover, NV
Facility planning and design of upgrade to MBR system and improvements to the headworks facility, including new screening and washing equipment, HVAC, and utility water system.

Taos Wastewater Treatment Plant Expansion and Upgrade - Town of Taos, NM
Utilized an MBR process design to bring the plant to a capacity of 2 mgd and provide recycled water quality effluent.

Imperial County Wastewater Treatment Plant - Imperial, CA
5 mgd Zenon hollow fiber membrane system, expandable to 15 mgd. Fine screening, process tanks and biological treatment system, UV disinfection facility, RIB's, and standby power.

Springville City Wastewater Treatment Plant - Springville, UT
Expansion and upgrade utilizing STM Aerotor process to bring the plant to a capacity of 6 mgd.

Heber Wastewater Treatment Plant - Heber, CA
1.2 mgd activated sludge treatment plant facility expansion.

Inscription Canyon Ranch Wastewater Treatment Plant - Prescott, AZ
0.5 mgd Kubota flat plate MBR with fine screening, process tanks and biological treatment systems, UV disinfection facility, lab, operations building, and standby power.

Tooele City Wastewater Treatment Plant - Tooele, UT
Expansion to bring the plant from 2 mgd to 4mgd in two phases.

San Felipe Pueblo Wastewater Treatment Plant - San Felipe, NM
300,000 gpd Kubota flat plate MBR expandable to 600,000 gpd, includes offices, a small lab, biosolids dewatering, and a pump station to deliver treated water.

Jerome City Wastewater Treatment Plant - Jerome, ID
Expansion utilizing an MBR process. Several phases to bring plant capacity to 4.5 mgd.

The Cliffs Wastewater Treatment Plant - Boise, ID
Facility with 300,000 gpd Kubota MBR System expandable to 600,000 gpd including fine screening, process tanks, and biological treatment systems, UV disinfection facility, RIBs, and standby power.

Edgewood Wastewater Treatment Plant - Edgewood, NM
Facility design & construction of a 150,000 gpd Kubota MBR System.

Moroni City Wastewater Treatment Plant - Moroni, UT
Kubota MBR process for a 1 mgd plant that is primarily turkey processing waste.

Paako Wastewater Treatment Plant - Albuquerque, NM
Facility design & construction of a 0.26 mgd Kubota Flat Plate MBR Facility, included design of an influent screening system, back-up power system, and the associated telemetry control system.

Taos Wastewater Treatment Plant - Taos, NM
Design and construction of new headworks facility and septage receiving station.

Oakley Water Reclamation Facility - Oakley, UT
Design and construction of a Zenon ZeeWeed 250,000 GPD facility.

Hyrum Water Reclamation Facility - Hyrum City, UT
Facility planning, design, and construction upgrading this existing oxidation ditch facility to a 2 mgd MBR facility using Kubota membranes.

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Mark P. Jeppsen, P.E. - Principal

(801) 683-3760 - mark.jeppsen@skmeng.com

Mr. Jeppsen is an electrical, instrumentation and controls engineer with 26 years of experience in power design, controls engineering, process and instrumentation design, industrial network design, construction oversight, radio and telemetry systems, SCADA system design and integration and PLC and HMI design and integration. He has designed and integrated multiple potable water, secondary water, water treatment, wastewater collection and wastewater treatment systems. Design tasks include facility power, motor power and control, SCADA systems, instrumentation selection and control, process and instrumentation diagrams, communications networks and systems, control loop diagrams and descriptions. Integration tasks include control and PLC panel design and construction, PLC, OIT and HMI programming and commissioning, radio system integration and testing, instrument calibration, automated reporting systems and operator training and documentation.

Project Role

Electrical & Controls Engineer

Work Experience

23 Years

Education

BS Electrical Engineering
University of Utah, 2002

Registration

Professional Engineer:

Utah

Certification

Ignition Gold Certification

Specialties

- Electrical Engineering
- Control and SCADA Systems Design & Integration
- Network and Communications Design and Integration
- Water & Wastewater Facilities Process Control and Optimization
- Project Management
- Construction Management

Project Experience

2009 - 2021:
Jurupa Community Services District (JCSD), Jurupa, CA – Electrical and Controls Engineer
Mark has worked with JCSD on various projects over the years including the Regional Lift Station and various other lift stations. He has also was the lead electrical engineer on Wells 13, 27 & 28 as well as the JCSD-RCSD Booster Pump Station. Mark has worked closely with the District's controls engineer and O&M staff to develop designs drawings that are tailored to the District's standards.

2009 - Present:
Western Riverside County Regional Wastewater Authority (WRCRWA), Eastvale, CA – Electrical and Controls Engineer
In 2009 Mark led the electrical and control design for an aeration upgrade at the WRCRWA plant. This included a new blower building with associated controls for the existing oxidation ditches. In 2012 Mark was the lead electrical engineer for a complete plant expansion at WRCRWA which also included new network, PLC, and HMI systems. Since the completion of the expansion, Mark has provided services for several projects and has provided on-call support for the facility.

2006 – Present:
Salt Lake City, UT – Electrical and Controls Engineer
SKM has been providing services to Salt Lake City for their various water and wastewater facilities since 2006. Mark is currently overseeing the implementation of a complete control system upgrade at the 50 MGD Water Reclamation Facility which includes control panel upgrades, PLC replacements and new HMI screens. SKM has designed a new WAS thickening facility and is currently designing a new Headworks facility. Mark is the lead engineer and project manager for electrical and controls upgrades at the 20 MGD Big Cottonwood Water Treatment Plant that will be completed in 2018.

2004 – Present:
Central Weber Sewer Improvement District, UT – Electrical and Controls Engineer
SKM has been working for Central Weber Sewer Improvement District (CWSID) since 2004 by providing electrical designs, controls upgrades and system maintenance. Mark has managed upgrades at the plant as they have come, including upgrades for the influent pump building, utility water pump building and PLC & HMI upgrades. In 2006 design began for a complete 60 MGD plant expansion and SKM was an integral part of the design and integration team. Construction for this project began in 2008 and was completed in 2012.

2004 – Present:
Sandy City, UT – Electrical and Controls Engineer
SKM provided the complete and operational SCADA System for Sandy City's Water System that was completed in 2005. Since then, SKM has provided incremental additions, improvements and maintenance including a new storm water system. The system consists of nearly 40 remote sites that consist of tanks, boosters and wells. In 2016 SKM provided an HMI system upgrade for the water and storm water systems.

2003 – Present:
Park City, UT – Electrical and Controls Engineer
SKM began working for Park City by providing the system integration for an iron, arsenic and manganese removal process at the Spiro Water Treatment Plant in 2003. In 2012, SKM provided the complete and operational SCADA System for the Quinn's Junction Water Treatment Plant, a microfiltration membrane process. This included PLC & HMI programming, custom reports and historical data gathering and startup and commissioning. In 2016 SKM upgraded Park City's complete SCADA system which included their two water treatment plants and approximately 70 remote boosters, tanks, metering stations, PRV stations and well houses.

Mark P. Jeppsen, P.E. - Principal

Project Experience (continued)

2003 – Present:
City of Tooele, UT – Electrical and Controls Engineer
Mark began working for the City of Tooele by providing electrical and controls maintenance at the City's Water Reclamation Facility. In 2011 Mark was the lead electrical engineer for the design, construction and integration of a plant expansion at the Water Reclamation Facility. In 2015 SKM began providing electrical and controls services for the City's culinary water system.

2002 – Present:
City of Payson, UT – Electrical and Controls Engineer
The Payson Wastewater Treatment Plant was upgraded in 2002. Mark successfully implemented the electrical design for the project, oversaw the construction, and integrated the control system. A new fiber optic network was successfully installed and improved the operation and reliability of the SCADA system.

1999 – Present:
Springville City, UT – Electrical and Controls Engineer
Mark successfully designed and implemented the electrical and controls for two plant expansions at the Springville Wastewater Treatment Plant. The first expansion was in 1999 and the second in 2009. The expansions consisted of a new electrical service, new SCADA system and PLC replacements. SKM has been providing integration and maintenance services to the City since 1999.

1999 – Present:
Spanish Fork City, UT – Electrical and Controls Engineer
In 1999 SKM began working for Spanish Fork City by upgrading the electrical and controls system for their primary pump station at the Wastewater Treatment Plant. In 2004, the plant was expanded and Mark was the lead electrical and controls engineer for the project. He successfully implemented the electrical design for the project, oversaw the construction, and integrated the control system. A new fiber optic network was successfully installed and improved the operation and reliability of the SCADA system.

1998 – Present:
West Wendover, NV – Electrical and Controls Engineer
Since 1998 SKM has been providing services to the City of West Wendover for their water and wastewater systems. In 1999-2000 SKM performed a SCADA System replacement for both systems that incorporated new radios and equipment for their well field and pipeline located 20 miles from the City. In 2011-2012 SKM provided the design engineering and integration for a new MBR facility at the Water Reclamation Facility.

Other Project Experience

Present: Beaumont City, CA. WWTP MBR and RO Expansion

Present: Las Gallinas, CA. WWTP Expansion

Present: City of Imperial, CA. WWTP MBR Facility Expansion

Present: Central Davis Sewer District, Kaysville, UT. WAS Thickening Addition

2016: Ogden City, UT. Water System SCADA Upgrade

2016: Provo City, UT. WWTP UV Building Addition and Headworks Upgrade

2015: Ogden City, UT. WTP Microfiltration Upgrade

2015: Provo City, UT. WWTP Master Plan

2014: Imperial, CA. WTP Controls Upgrade

2013: City of Elko, NV. WWTP Upgrade

2013: Fort Shafter Flats, HI. WWTP MBR Facility

2011: Las Gallinas, CA. WWTP Microfiltration Addition

2011: Provo City, UT. WWTP Centrifuge Facility Upgrade

2011: Orem City, UT. WWTP Expansion

2010: Taos, NM: WWTP MBR Facility Expansion

2010: Moroni, NM: WWTP MBR Facility

2009: Brigham City, UT. WWTP Expansion

2008: Heber, CA. WWTP Expansion

2008: Inscription Canyon Ranch, AZ. WWTP MBR Plant

2008: Edgewood City, NM. WWTP MBR Facility

2007: Gallup, NM. WWTP Expansion

2006: Jerome City, ID. WWTP MBR Facility

2005: Hyrum City, UT. WWTP MBR Facility

2003: Oakley City, UT. WWTP MBR Facility

Boris Petkovic, P.E. | Principal

Phone: 801.683.3734 | **Email:** boris.petkovic@aquaeng.com

Mr. Petkovic has nearly a decade of experience in water resources and wastewater engineering with a focus on wastewater treatment facility design. Boris has established a reputation for his extensive expertise in designing headworks, clarification/sedimentation facilities, biological reactors, tertiary treatment processes, disinfection facilities and biosolids stabilization and handling facilities. Boris has a background in modeling wastewater systems, including mass balance and hydraulic profile modeling and calculations. He also has completed several storm water, culinary water, and wastewater master plans and studies.

Project Experience

Wastewater Treatment

City of Imperial Wastewater Treatment Plant Upgrade City of Beaumont, CA
Project engineer/manager for the upgrade of the existing wastewater treatment plant. Specific duties included preliminary process evaluation and facility planning, final process modeling (BioWIN), design of secondary treatment BNR process, MBR facilities and a new dewatering facility with two screw presses.

City of Beaumont Waste Water Treatment Plant – Salt Mitigation Upgrade City of Beaumont, CA Project engineer for the salt mitigation upgrade of the existing wastewater treatment plant. Upgrade included hydraulic capacity increase and process modifications. Specific duties included preliminary process evaluation and final process modelling (BioWIN), design of secondary treatment BNR process, MBR, and RO systems for TDS removal as well as upgrades to existing dewatering facility including installation of two new centrifuges and solids load-out structure.

Western Riverside County Regional Wastewater Authority (WRCRWA), Riverside CA, Plant Expansion Project
Project engineer for the facility expansion. Specific duties included design of a new bioreactor basin, tertiary filtration system, dewatering facility with three centrifuges, sludge solar drying faciiity, and existing digester modifications (conversion from aerobic to anaerobic digesters)

Western Riverside County Regional Wastewater Authority, Riverside CA, Expansion Study
Developed a study for a 5 MGD plant expansion. The study involved evaluation of process modifications, different solids stabilization and handling processes as well as an evaluation of overall plant energy consumption.

City of Corona Wastewater Treatment Plant Sludge Holding Project, Corona, CA
Plant modifications which included conversion of an existing chlorine contact basin to a sludge holding tank. Installation of primary and Waste Activated Sludge (WAS) screens, odor control, and associated pumping in a very complex site.

Western Riverside County Regional Wastewater Authority, Riverside CA, Aeration Upgrade
Conversion of existing Ox. Ditches to staged aeration. The work included process design, selection of the fine bubble aeration equipment, aeration blowers, and the design of blower building and aeration piping.

Elwood Town Corporation UT, Wastewater Treatment Plant Construction Project
Construction of a new wastewater treatment plant. The project included construction of a new concrete tank for a sequencing batch reactor, construction of a new headworks/blower building, and the construction of a new disinfection building. Also, the project includes construction of several earthen basins, an effluent winter storage pond, and an irrigation pump station for the reclaimed effluent.

Brigham City UT, Wastewater Treatment Plant (WWTP) Upgrade
Project engineer with specific duties that included design of a new secondary clarifier with a scum pump station, addition of a new UV disinfection system and UV building, and an addition of a new solids dewatering building with new dewatering screw presses. The project also included modifications to the existing WAS/RAS pump station and modification of existing headworks building.

Water Reclamation Facility

White Rock Water Resource Recovery Facility Improvements, Los Alamos, NM
Project engineer/manager for plant improvement project. Specific duties included project management

Education

B.S. Civil & Environmental Engineering, University of Utah, 2005

M.S. Civil & Environmental Engineering, University of Utah, 2008

Registration

Professional Engineer: Utah

Work Experience

20 Years

Affiliations

WEAU

WEF

Certifications

BioWin Plant Model

Expertise

- Wastewater Treatment
- Biosolids Treatment and Disposal
- Wastewater Reuse
- Process and Hydraulic Modeling
- Detailed Mechanical Design
- Planning & Design
- Condition Assessments

Boris Petkovic, P.E. | Principal

Project Experience (continued)

and coordination with a multidisciplinary team and design of secondary process facilities including an Oxidation Ditch, secondary clarification, tertiary filtration, UV disinfection, and dewatering facilities (screw presses)

Salt Lake City Water Reclamation Facility – Influent Screens Replacement/Rehabilitation Project, Salt Lake City, UT Project engineer/manager for the replacement of influent screens at a 66.0 MGD peak flow facility. Specific duties included condition assessment, hydraulic evaluation and selection of new screening equipment, and overall rehabilitation of the screening facility. Duties also included managing of construction engineering services.

City of Moab Water Reclamation Facility, City of Moab, UT
Project engineer for the construction of a new 2.0 MGD Water Reclamation Facility. Specific duties included design of a Sequencing Batch Reactor treatment facility, intermediate pump station, headworks facilities (screenings and grit removal), bio-solids holding and dewatering facilities with two screw presses, and UV disinfection facility.

City of Rexburg Water Reclamation Facility Solids Handling Project, Rexburg, ID
Expansion of solids handling process by converting to anaerobic digestion and pasteurization to produce Class A biosolids and provide for solids storage.

Fort Shafter Flats Pump Station, Honolulu HI, Water Reclamation Facility Construction Project
Construction of a new Membrane Bio Reactor (MBR) water reclamation facility at the Fort Shafter Army Base. The project includes modification of a seventy-year-old pump station to anoxic basins, construction of new aeration basins, construction of a new MBR basin, new headworks and solids handling equipment.

City of Provo Water Reclamation Facility UT, UV Disinfection, Digester Mixing, and Headworks Modification Project
Existing WRF upgrade project. The project includes modification of the existing headworks building, construction of a new UV disinfection building, and installation of new digester mixing equipment.

City of Elko Water Reclamation Facility Upgrade, City of Elko, NV
Analyzed potential biological treatment process alternatives, selection of the biological treatment process, and final design. The final design included the construction of a new IFAS process basin and modification of several existing hydraulic and process structures (secondary clarifiers, hydraulic control structures, etc.)

Tooele City UT, Water Reclamation Facility Upgrade, Phase 1B
Project engineer for the upgrade of the existing facility including new circular concrete sludge holding tank with fine bubble diffuser mixing, modifications of the existing solids handling building, design of a new UV disinfection system and building (existing chlorine contact basin retrofit), and the design of a new solids dewatering building with two screw presses and a sludge solar drying facility.

West Wendover NV, Water Reclamation Facility Phase II Upgrade
Construction of a new influent lift station, addition of a new grit trap, construction of a new MBR facility with UV disinfection and modifications of the existing aeration basins. The project also included the expansion of the dewatering facility and the construction of a new building to house tertiary filters for the treatment of the stored effluent.

City of Page AZ, Water Reclamation Facility Upgrade
Evaluated existing facility process and hydraulic capacity and designed required modifications to allow de-nitrification in the existing oxidation ditches in order to produce Class A effluent.

Spanish Fork City Water Reclamation Facility UT, Anaerobic Digester Tank Addition
Addition of an anaerobic digestion tank and modifications of the existing digester control room. The project included the design of a new concrete tank, mixing system (Linear Motion Mixer), modification of the sludge recirculation pumping and piping, addition of a new heat exchanger and boiler, as well as modification of the existing anaerobic digestion tank (addition of Linear Motion mixer).

City of Provo Water Reclamation Facility UT, Solids Handling Building Expansion
Project engineer for the upgrade of the existing dewatering facility. The project included solids dewatering building expansion, addition of a new centrifuge, screw conveyor, sludge feed pump, mixing system for the sludge holding tank, and modifications of the existing solids hopper.

Registrations
Registered Civil Engineer C 73208
Registered Structural Engineer SE 6084

Education
MS, Structural Engineering, University of California, San Diego
BS, Structural Engineering, University of California, San Diego

Affiliations
Structural Engineers Association of San Diego (SEAOSD)

American Society of Engineers (ASCE)

Work Experience:
Kleinfelder
2006-Current

Christina Nishimoto, PE, SE

Project Manager

Kleinfelder

Christina Nishimoto has 18 years of professional experience including working with steel, concrete, masonry, and timber structures and is knowledgeable in the design considerations of all four materials and their respective governing codes. Her design phase work has included attending meetings, coordinating with other professional trades, structural analysis, and detailing.

Wastewater Treatment Plant Expansion and Salt Mitigation Project, City of Beaumont - Christina serves as Structural Project Engineer for the City's project which consists of two major components:
Wastewater Treatment Plant (WWTP) Expansion and Upgrade - Final Design (Structural) - The existing WWTP needs to be expanded and upgraded. The WWTP is currently treating over 75% of its permitted capacity and therefore must begin the expansion process. Per the new Regional Water Quality Control Board's updated Basin Plan, the City must begin reducing TDS being discharged from the plant. The City completed a feasibility study to identify the best way to expand and upgrade the plant. The Plant will be converted to an MBR process followed by RO for TDS reduction. The Plant will also add screening, EQ, sludge dewatering, and drying.

Brine Line - Final Design (Structural) - Brine disposal is an integral part of this project and was a key driver in the selection of this project. Without a safe, reliable, and cost effective way to dispose of the brine, this project cannot move forward and compliance with the Basin Plan would be impossible. The brine pipeline connecting to the Inland Empire Brine Line (IEBL) was determined to be the best option during the feasibility study, due to cost and certainty of operation. The brine line has been sized at 12-inches and will be approximately 23-miles long. The pipeline begins at the City's WWTP and ends near the City of San Bernardino's WWTP on Waterman Avenue.

WRCWRA Wastewater Treatment Plant, Western Riverside County Regional Wastewater Authority - Christina served as Structural Project Engineer for the WEBB Team that designed the 14 MGD plant expansion. The expansion project included evaluating alternatives to provide additional flow and biological capacity while reducing the overall cost of treatment. WEBB's design includes primary, secondary, and tertiary treatment along with disinfection and solids handling. Working with the member agencies, cost effective alternatives are

ng selected and refined to make this project affordable to build while reducing the cost of treatment. The ›ject also includes chemical storage and pumping.

ramar Clearwell Improvements, City of San Diego Public Utilities Department - Christina served as ›ject Engineer providing the design of two new rectangular hopper bottom reservoirs, totaling 58.3 MG. The ıctural system is a two-way reinforced concrete roof with drop panels supported seismically by perimeter ıcrete shearwalls. Christina also designed a 5 MG chlorine contact chamber of similar structural system ł assisted in managing the work of a number of subconsultants, including the water disinfection process, hitectural, civil, landscaping, and environmental permitting.

ditional Experience:

ınt 150, East Valley Water District - Christina served as Project Engineer providing foundation culations, drawings, and specifications for Plant 150, a centralized water treatment plant. The scope of rk included a ring foundation for two 500,000 gallon steel tanks for surface water, concrete foundations for operations building, chemical building, and multiple ion exchange tanks.

int Loma Sedimentation Basin Rehabilitation, City of San Diego - Christina served as Project Engineer the Point Loma Wastewater Treatment Plant project that consists of 12 existing sedimentation basins ıstructed as several different projects starting in 1962 through 1996. The result of the varying projects is ı-uniformity within the 12 basins. Christina provided support on structural engineering services provided by F|SWE which included site evaluation, design and drafting, and construction administration during the ıstruction process. Additionally, Christina provided the design of a pipe support rack.

mp Stations 1 and 2, City of San Diego Metropolitan Wastewater Department - Christina provide ıctural calculations and construction support for this design-build project. KLF/SWE's scope of wor luded the design of a two-story concrete masonry building at Pump Station 2 as a sub-consultant t rollo Engineers. The first floor of the building is an electrical room and the second floor is used for storage ə structural system of the building consists of long span trusses for the roof framing, composite floor, an ıat foundation.

in Oaks Central Basin, Central Basin Municipal Water District - Christina served as Project Enginee ›viding design calculations for the 50 MGD design/build water treatment plant. The design included pum tions, arc flow treatment barriers, two 14 MGD reservoirs, and an ozone treatment facility and filter basin

la Casino Wastewater Treatment Plant, Pala Band of Mission Indians - Christina served as Projec gineer providing the design calculations for this project, which provided the Pala Band of Mission Indian ew wastewater treatment plant and upgrades to the existing lift station.

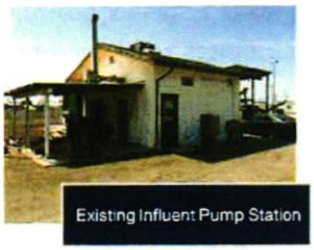
ase I Expansion, Riverside Regional Water Quality Control Plant - Christina served as the Project gineer and provided construction support services for the Phase I expansion. KLF/SWE's scope of work luded design consulting services for this project. The expansion scope was to replace 20 MGD of sting conventional activated sludge capacity with 26 MGD of membrane bioreactor capacity.

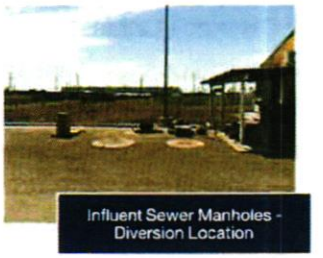
4. PROPOSED PROJECT APPROACH

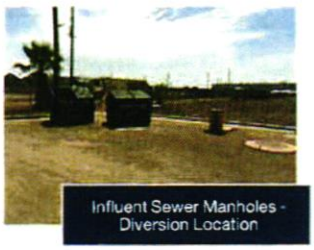
Project Understanding and Approach

The City of Imperial's Wastewater Treatment Plant (WWTP) Upgrade in 2021 incorporated membrane bioreactor (MBR) technology, increasing treatment capacity to an average day flow (ADF) of 2.4 MGD and a peak hourly flow (PHF) of 5.3 MGD. Future flows are planned to be 3.0 MGD ADF and 6.3 MGD PHF.


Operations Building to be Protected in Place (Remodel by City Under Separate Contract)


Existing Influent Pump Station

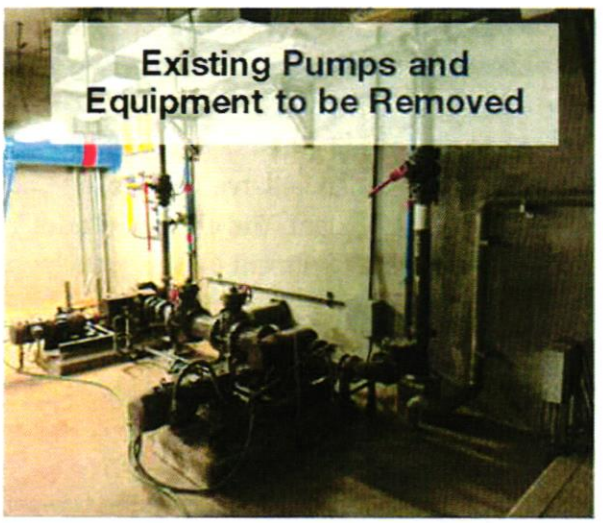

Influent Sewer Manholes - Diversion Location

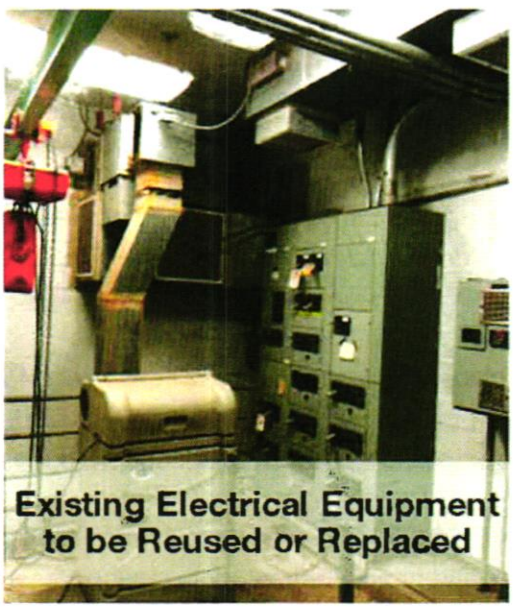

Influent Sewer Manholes - Diversion Location

Due to budget constraints, the Influent Pump Station was not modified or replaced as part of the 2021 project. This project will design a new Headworks Screening Facility ahead of a new Influent Pump Station. In addition, foul air odor treatment will be implemented to improve operating conditions and reduce the corrosivity within the treatment plant.

There are several **critical issues** relating to this project that must be addressed as part of the final design, including

1. Maintaining plant operation
2. Increasing influent pumping capacity
3. Improving operability and maintenance
4. Reducing corrosivity throughout the Plant
5. Constructability and perched groundwater


Existing Pumps and Equipment to be Removed


Existing Electrical Equipment to be Reused or Replaced

The critical issues are discussed further.

Maintaining Plant Operation

- Plant flow must be maintained throughout construction. ***A detailed phasing plan will be reviewed with the City and included with the bid documents to clearly identify shutdown and bypass parameters.*** The contractor will be required to submit detailed bypass and phasing plans for approval prior to beginning any work impacting Plant operations.
- The influent pipelines converge at three manholes upstream of the existing pump station, where diversions must occur. These manholes have recently been rehabilitated by the City. Careful design considerations will be needed to determine the most effective methods to divert flow to the new facility. There is at least one other influent sewer and one site drain that connect directly to the existing wetwell. Those pipelines will need to be diverted to the new system as well.
- Bypass pumping strategies and electrical cutovers will be critical to ensuring uninterrupted service during construction. Our design documents will clearly show bypassing/shutdown requirements.

Increasing Influent Pumping Capacity

- The new headworks screens and pumps will be designed to efficiently handle current average daily flows of 2.4 MGD and peak hourly flows of 5.3 MGD. ***The project must also handle the future average daily flows of 3.0 MGD and peak hourly flows of 6.3 MGD***.
- A manual screen bypass channel will be included to maintain flow to the pump station when screens are offline.
- Pumping capacity will be met with an n+1 configuration, meaning that a spare unit will be installed to meet capacity with one screen or pump offline.

Improving Operability and Maintenance

- The existing influent pump station lacks screening, allowing debris to clog pumps and accumulate in the wet well. The City prefers a step-screen style unit.
- The existing influent pump station wet well and pumping units are very difficult to access, which makes cleaning, maintenance and repairs extremely challenging. ***The new headworks must provide safe, efficient access for maintenance personnel to streamline operations and reduce downtime.***
- Headworks screening will improve the operation and longevity of the new influent pumps. Screenings will be delivered to an easily serviceable trash dumpster at ground level.

Reduce Corrosivity throughout Plant

- Highly corrosive gases in the influent have caused significant wear and tear on the pump station, fine screens, grit equipment, and nearby infrastructure.
- The new gas scrubbing and treatment system will be included to ***protect downstream equipment and extend the system lifespan.***

Constructability and Perched Groundwater

- Groundwater was encountered during the geotechnical investigation at initial depths of 13 ft below ground surface (BGS). Our team installed two piezometers near the operations building and water levels have been observed between 8 and 9 feet.
- The new headworks structure, expected to extend at least 30 feet below the ground surface, will require proactive ***dewatering and groundwater mitigation strategies to prevent construction delays and ensure long-term stability***. Our design documents will ensure that the contract has an approved dewatering plan prior to beginning construction.

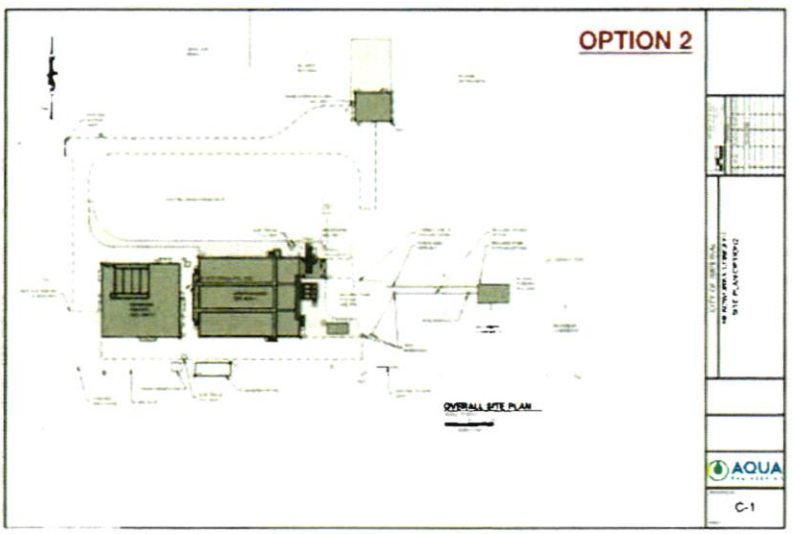
- Our structural design will account for sustained groundwater and ensure that the structure does not "float"

The costs associated with the two options presented in the PER were relatively similar and the City selected Option 2 to move forward into final design. Option 2 includes a few critical benefits including:

- Pumps and motors will be located in the existing RAS/WAS Pump Building and will be accessible for maintenance.
- Pumps will be dry pit self-priming pumps similar to the majority of the City's existing sewage pumps rather than submersible pumps. This creates continuity in maintenance and operation.
- Utilizes and existing pump building and simplifies the electrical feed to the pumps
- The location prevents the need to demolish the existing operations building

The preliminary drawings below are from the PER and represent the initial concepts our team will follow for the final design.

As shown in **Drawing C-1**, the new Headworks channel structure and screens will be located directly north of the abandoned secondary clarifier #2 and adjacent to the existing Sludge Pumping Building. A new gravity pipeline will be constructed to deliver flow from the trunk sewers entering the Plant south of the existing Influent Pump Station to the new Headworks Screening Facility. Careful planning and execution will be required to bypass flow while making the deep pipeline connections. A new forcemain from the new Influent Pump Station will deliver flow into the existing Fine Screens and downstream facilities.

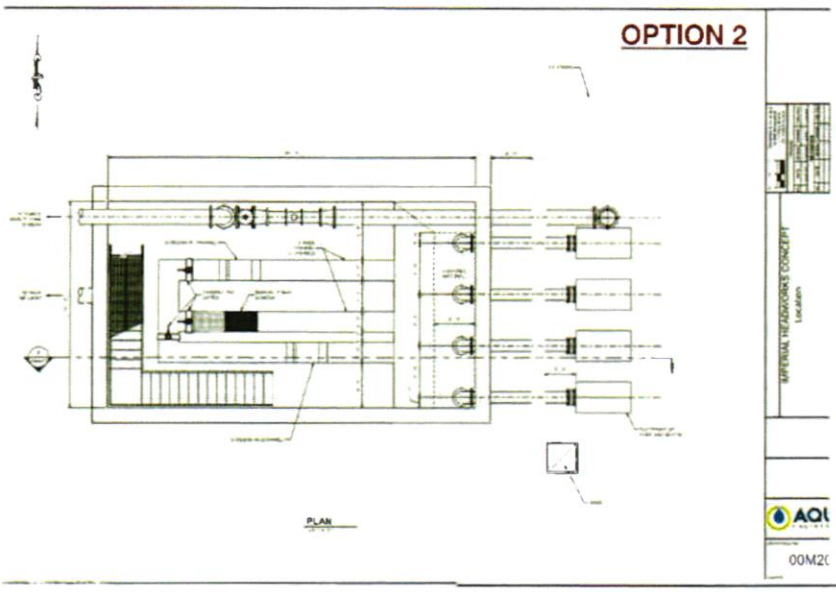


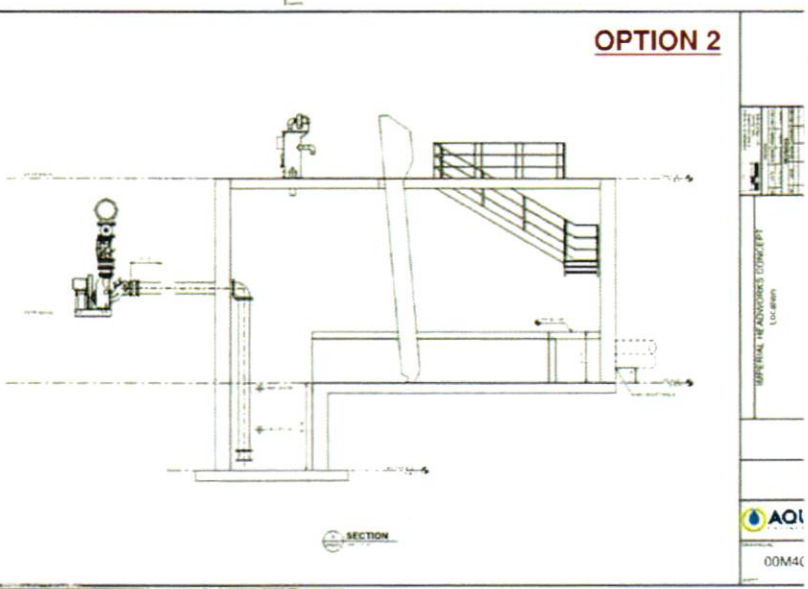
Drawing M201 shows the plan view layout of the new Headworks Screening facility, which will be equipped with three channels. Two channels will have automated screens with ¼-inch openings. The third channel will be an emergency bypass channel. All three channels will be capable of passing the PHF of 6.3 MGD. The west side of Drawing M201 shows how the new Influent Pumps will lay out with suction pipes being located in a sump at the end of the screening channels. The pumps and motors will be located within the existing Sludge Pumping Building. The pumps will be designed so that PHF can be conveyed with three pumps and one pump as a standby (N+1 configuration).

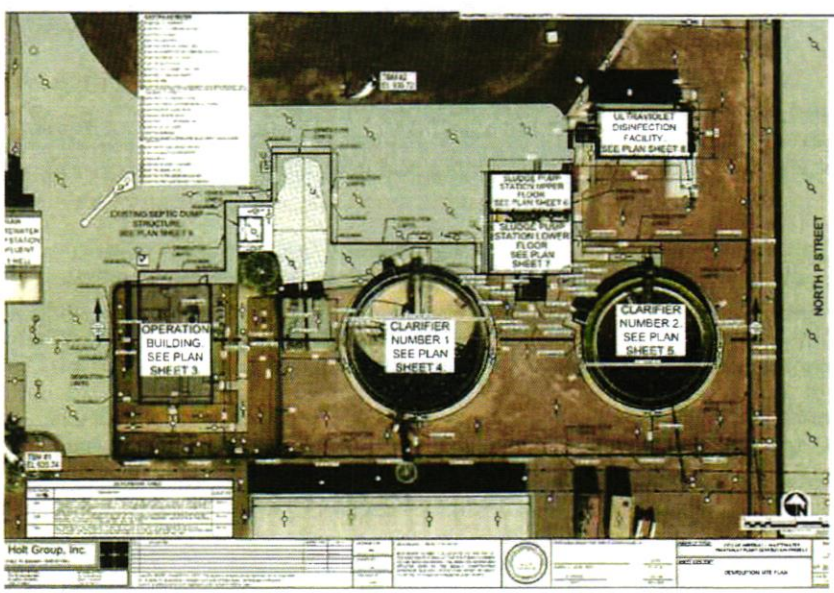
Drawing M401 shows a section view of the structure and gives perspective regarding overall depth of the structure and how the pump suction will be configured. Special attention will be given to ensure that suction conditions are adequate for the self-priming pumps and that solids removed from the influent are conveyed up to ground level and deposited into a dumpster for disposal. The channels and wetwell will be covered and foul air will be treated through a new Scrubber system to reduce corrosive conditions at the headworks and downstream facilities.

The **Demolition** drawing shows the previously anticipated extents of the removal of existing facilities. With the selection of Option 2, the existing Operations Building does not need to be removed. The Holt Group prepared the demolition plans. As a member of our project team for this project, we will coordinate with Holt to modify the demolition plans (under separate contract) to match the needs of the Headworks and Influent Pump Station project.

All equipment within the new Headworks area will be a minimum of 316 stainless steel or other corrosion resistant materials.


OPTION 2
PLAN
IMPERIAL TEFADORKS CONCEPT
00M2(


OPTION 2
SECTION
IMPERIAL TEFADORKS CONCEPT
00M4(


UL TRAVIOLET DISINFECTION FACILITY SEE PLAN SHEET 8
SLUDGE PUMP STATION UPPER FLOOR SEE PLAN SHEET 6
SLUDGE PUMP STATION LOWER FLOOR SEE PLAN SHEET 7
EXISTING SEPTIC DUMP STRUCTURE SEE PLAN SHEET 9
OPERATION BUILDING SEE PLAN SHEET 3
CLARIFIER NUMBER 1 SEE PLAN SHEET 4
CLARIFIER NUMBER 2 SEE PLAN SHEET 5
NORTH P STREET
Holt Group, Inc.

Scope of Work

Our team will provide the scope of services as outlined in the RFP and as follows:

TASK 1 – PRE-DESIGN SERVICES

Task 1.A – Project Management

WEBB will develop, maintain, and monitor the overall project scope, budget, and schedule throughout the duration of the Project. During scheduled review meetings, WEBB and the City will collaborate to ensure that the project decisions are in the best interest of the overall goals. Periodic coordination calls will take place as needed. Monthly progress reports will be prepared, including updates to the overall project schedule.

Task 1.B – Kickoff Meeting, Site Visit & Review Record Drawings

Before the commencement of the first design package, WEBB will conduct a kick-off meeting and work session with the City and design team members to review the project scope, objectives, critical success factors and establish project communication protocols. Our team will put together a list of documentation and information that will be requested from the City to verify existing conditions. The work session will include visiting the Plant to review project specifics and field conditions prior to the work beginning.

Task 1.C – Site Survey

The Holt Group prepared a recent survey for the Demolition Project, which will be utilized for this project. It is anticipated that Holt will spend one day of additional field survey to supplement the previous survey.

Task 1.D – Utility Research

WEBB will review record drawings previously obtained from the City for the Black & Veatch expansion project as well as Holt's Demolition project. Our team prepared the 2008 Biolac upgrade project and the 2021 MBR Upgrade project so we have the record drawings for those facilities. We do not anticipate the need to do potholing during the design phase. If necessary, we will require the contractor to perform potholing prior to the commencement of construction.

Task 1.E – Quality Assurance / Quality Control (QA/QC)

Throughout the project, our team will be responsible for providing overall quality assurance/quality control and ensuring that deliverables meet the highest standards to address the goals of the Project. Senior level reviews will take place prior to all deliverables being submitted to the City.

Task 1.G – CEQA Documentation

Our team will prepare CEQA Class 2 Exemption document covering the project as a replacement of existing facilities. We will provide the exemption documentation to the City to be posted with the clearinghouse for the mandatory 45 day posting period. Posting fees will be paid by the City.

Task 1.H – Regional Board Permitting Assistance

Our team will assist the City in preparing Regional Board permit applications for the modifications to the Plant. We will provide technical information and exhibits required for the applications. Attendance at two meetings with the Regional Board is also included in our scope of work. All permit fees will be paid by the City.

TASK 2 – DESIGN SERVICES

Task 2.A – Preliminary Design (30% Design)

The preliminary design task will identify key elements to the project, develop the construction sequencing for the project to ensure continuous operations, and establish the project framework. These items will be reviewed in our preliminary design workshop with City. The 30% design submittal will include the overall site layout, PID, single line diagram for electrical, basic equipment locations/layouts, and a sequencing plan.

Task 2.B – 60% Design Submittal

The 60% submittal will include demo plans for the removal of existing equipment/facilities, civil, mechanical, yard piping, electrical, and instrumentation drawings. Draft specifications will be submitted for City review as well. Along with the design documents, our team will prepare a detailed opinion of construction cost to allow the City to verify the project budget. The 60% documents will be reviewed with the City in a workshop format to facilitate comments and input regarding operations, maintenance, system connections and operational shutdowns.

Task 2.C – 90% Design Submittal

The 90% submittal will build upon the 60% submittal, review workshop, and City comments. The cost estimate will be updated and final specifications prepared. The 90% submittal is intended to be a complete set of construction documents for final review by the City.

Task 2.D - Final Design Submittal

The final comments from the City will be incorporated and final signed/stamped construction documents will be submitted to allow the City to advertise for construction bids. The documents will include all required plans, a final opinion of cost, construction sequencing work plan, and theory of operation.

TASK 3 – BID SUPPORT

Task 3.A – Bidding Support, Addenda, and Bid Review

WEBB will support to the City during the construction bidding process including responding to contractor questions, preparing up to two (2) bid addenda, reviewing the contractor bids, and preparing a recommendation for award.

Task 3.B – Attend Contractor PreBid Meeting

WEBB will attend the contractor prebid site meeting and provide support to the City purchasing group. Assumed that two members from the Design team will attend the meeting.

Task 3.C – Submittal Review

WEBB will review contractor's equipment and material submittals for conformance with the contract/design requirements. It is assumed that we will review up to 20 submittals.

Project Schedule

Task	Start Date	Completion Date	Duration (Days)*	Predecessor(s)
iotice to Proceed	1/7/2026	1/8/2026	1	
ick-off Meeting	1/14/2026	1/14/2026	1	Notice to Proceed
ield Visit	1/14/2026	1/14/2026	1	Notice to Proceed
re-Design Services	1/14/2026	7/8/2026	175	Kick-off Meeting
0% Design Submittal	1/14/2026	2/11/2026	28	Kick-off Meeting
esign Workshop and ity Review	2/11/2026	2/11/2026	1	30% Design Submittal
ity Review (post-orkshop)	2/11/2026	2/25/2026	14	Design Workshop
EQA Documentation	2/25/2026	4/29/2026	63	30% Design Submittal
0% Design Submittal	2/25/2026	4/8/2026	42	City Review (post-workshop)
egional Board ermitting	4/8/2026	4/30/2027	365	60% Design Submittal
ity Review (60%)	4/8/2026	4/22/2026	14	60% Design Submittal
0% Design Submittal	4/22/2026	6/3/2026	42	City Review (60%)
ity Review (90%)	6/3/2026	6/17/2026	14	90% Design Submittal
inal Design Documents	6/17/2026	7/8/2026	21	City Review (90%)
idding	10/6/2026	11/5/2026	30	Final Design Documents
onstruction	2/3/2027	6/30/2027	365	Bidding

5. SUBCONSULTANTS

Integrated Partners

Our collaborative spirit with partners like AQUA Engineering, SKM, Kleinfelder, LandMark Geotechnical, and The Holt Group has been instrumental in pushing the boundaries of traditional wastewater management projects. Over the past two decades, we have embarked on several pioneering projects together, including the following projects, setting new benchmarks in the industry and paving the way for our future endeavors:

City of Imperial:

- **Wastewater Treatment Plant 2.4 MGD Expansion**
- **Wastewater Treatment Plant 1.0 MGD Expansion**
- **B Street Lift Station Upgrade**
- **HWY 86 Sewer Crossing**
- **Aten Road Lift Station**
- **High Service Booster Station**
- **GAC Treatment System**

Western Riverside County Regional Wastewater Authority:

- **Wastewater Treatment Plant 14 MGD Expansion**
- **5 Year CIP Evaluation and Management**

City of Beaumont:

- **Wastewater Treatment Plant Upgrades: Salt Mitigation and Recycled Water**

City of Corona:

- **WRF2 Aeration and Odor Control Optimization**
- **WRF1 Digester Upgrades**
- **WRF1 Centrifuge Replacement**
- **WRF1 Blower and MCC Replacement**

Moulton Niguel Water District:

- **Regional Plant Salinity Management System**

This partnership is more than an engineering achievement; it results from decades of trust and teamwork among the partners. Our roles in this are expansive, from conducting comprehensive field investigations to managing the intricate design and construction stages. Each firm's involvement leverages unique strengths, ensuring the project's execution is as innovative as its design.

As we look to the future, the partners are committed to leading the industry in technically excellent, client-focused wastewater treatment design and implementation. Our methodical approach reflects our commitment to precision and innovative solutions that address current needs and future challenges.

AQUA Engineering (AQUA)

Wastewater Treatment

AQUA is a civil engineering firm specializing in municipal engineering, water and wastewater treatment design, water resources, and environmental services. It is headquartered in Bountiful, Utah, and has a location in Denver, Colorado. AQUA has provided quality services to clients throughout the West and is one of the region's leading civil engineering firms. It is qualified, responsive, and highly experienced in designing, operating, and maintaining water and wastewater treatment facilities. WEBB has teamed with AQUA on water and sewer design projects, sewer master plans, and other planning work, supporting public agencies with setting conditions and performing plan checks for new development. WEBB and AQUA have also teamed on the design and construction support for many wastewater treatment plant projects in California.

SKM Engineering (SKM)

Electrical Engineering

SKM Engineering will provide electrical engineering services for the City's project. SKM is a premier electrical engineering firm specializing in SCADA (supervisory control and data acquisition), telemetry, and electrical and control design. They employ a staff of highly trained electrical engineers with extensive experience in electrical design, instrumentation, and controls, as well as PLC and HMI programming and design services. Their focus on wastewater and water systems provides clients with extensive process knowledge and understanding of treatment projects.

Kleinfelder

Structural Engineering

Kleinfelder will provide structural engineering services for the WEBB Team. A multi-disciplinary team delivers Kleinfelder's structural engineering services of experts to various public agencies and private companies. During the past 25 years, their experienced structural engineers have gradually adapted to changing technology, codes, and standards. Kleinfelder's structural design is fully integrated with technology using recent software developments such as BIM (Building Information Modeling), SAP 2000, Larsa 4D Bridge Plus, and others. Kleinfelder's structural engineers have extensive experience in the design and construction management support for various projects utilizing current guidelines, codes, and standards. They have an outstanding reputation for accomplishing projects on time and within the original negotiated budget. WEBB has worked with Kleinfelder for more than 50 years.

Additional Subconsultants

LandMark Consultants, Inc. (LandMark)

Geotechnical Analysis

LandMark Consultants, Inc. (LandMark) is a consulting firm specializing in geotechnical engineering and construction materials testing services in the Imperial, Riverside, and San Bernardino County areas of Southern California. The firm was incorporated in El Centro in 2003, but its staff has worked with Southland Geotechnical since 1987. The LandMark's El Centro team has had a long history of collaboration since 1982. It has built a reputation for providing high-quality, cost-effective, responsive technical and professional services. The technical expertise and dedication of LandMark's staff enable them to deliver innovative and cost-effective geotechnical consulting services for both small and large projects, particularly in challenging site conditions. LandMark is committed to developing strong working relationships with clients and other stakeholders, grounded in integrity, mutual respect, and a shared commitment to designing and constructing outstanding projects.

The Holt Group, Inc. (Holt)

Land Survey

The Holt Group, Inc., founded in 1984 by Robert K. Holt and James "Jack" Holt, is an Engineering and Planning firm with 38 well-qualified employees, many of whom have been with the company for over a decade or more. The Holt Group, Inc. provides Civil Engineering, Surveying, Construction Management and Inspection, Planning, Environmental, Grant Writing and Administration, Housing Program Administration, Labor Standards Compliance, and Lead-Based Paint Testing to various municipal, institutional, and private sector Clients. The fundamental business strategy at The Holt Group is building long-term Client relationships. With over 25 years in the industry, Holt has attracted and maintained well-respected Clients in numerous sectors by providing superior customer service and an unparalleled quality of work. The majority of work - roughly 80 percent - is performed for repeat clients. Holt's team of talented employees currently consists of Professional Engineers registered in California, Arizona, Nevada, Utah, Michigan, and Mexico, Land Surveyors registered in California and Arizona, and Planners certified by the American Institute of Certified Planners (AICP) with the experience necessary to complete any job, large or small, on time and within budget.

6. CLIENT REFERENCE LIST

The City will benefit from WEBB's team's approach to client service. Our reputation for superior quality work, integrity, and long-standing client relationships is a direct result of our industry proven capabilities and experience.

We encourage the City to speak with your staff who have worked with our firm and call our references to truly understand the commitment we make to each of our clients and their projects.

All references are for similar wastewater infrastructure projects completed within the past ten years.

AGENCY	CONTACT
City of Imperial 420 South Imperial Avenue Imperial, CA 92251	Christopher Kemp, Chief Wastewater Operator 760.457.5772, ckemp@cityofimperial.org
City of Beaumont 550 East 6th Street Beaumont, CA 92223	Thaxton Van Belle, General Manager, Utilities 951.572.3195, tvanbelle@beaumontca.gov
Western Riverside County Regional Wastewater Authority 16451 El Sobrante Road Riverside, CA 92503	Tony Pollak, Assistant Deputy Director of Operations 951.789.5114, tpollak@wmwd.com
City of Corona 400 South Vicentia Avenue, Suite 320 Corona, CA 92882	Mauro Casas, Chief Water Reclamation Officer 951.739.4817, mauro.casas@coronaca.gov

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7. FEE SCHEDULE

Person-Hour Estimate and Lump Sum Fixed Fee

Our lump sum fixed fee for this project will be $395,760 and a detailed breakdown of hours by task is provided below.

A breakdown of the fee by major task is as follows:

Task 1	Pre-Design Services	$50,750
Task 2	Design Services	$286,400
Task 3	Bid Support	$58,610
Total		$395,760

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City of Imperial - Influent Pump Station and Headworks Final Design

2025	3.1	Knoll, Brian P.	Bloomfield, Shane	Vigneault, Tyler J.	Vollrath, Andrew H.	DeWoody, Autumn	Hinkley, Lexi	Justin Logan	Boris Petkovik	Mitchell Weldon	Kenneth Baetz	Mark Jeppsen	Robert Martinez	SKM Designer	Admin	Total Hours	Subtotal - Labor	Sub-Consultant	Expenses	Total Task
	Classification	Principal III	Principal III	Senior I	Associate I	Senior I	Project Coord	AQUA Principa	AQUA Sr. Engi	AQUA Enginee	AQUA Designe	SKM Principal	SKM Engineer	SKM Designer	AQUA/SKM Ad			15%		
	Billout Rate	$ 331	$ 331	$ 276	$ 232	$ 276	$ 150	$ 270	$ 265	$ 225	$ 184	$ 270	$ 247	$ 184	$ 115		Sub total - labor	Sub-Consultant	Expenses	Total Task
Task 1	**Pre-Design Services**	**32**	**32**	**14**		**32**	**6**	**14**		**14**		**10**	**12**			**166**	**$ 47,374**	**$ 2,875**	**$ 500**	**$ 50,750**
A	Project Management	8	20				4									**32**	$ 9,868	$ -	$ -	**$ 9,870**
B	Kickoff Meeting, Site Visit, Review Record Drawings	4	8				2	4		4			8			**30**	$ 8,228	$ -	$ 250	**$ 8,480**
C	Site Survey		2	2						2						**6**	$ 1,664	$ 2,875	$ 100	**$ 4,640**
D	Utility Research		2	4						4			4			**14**	$ 3,654	$ -	$ -	**$ 3,650**
E	QA/QC	10						10				10				**30**	$ 8,710	$ -	$ -	**$ 8,710**
G	CEQA Documentation	2				12										**14**	$ 3,974	$ -	$ -	**$ 3,970**
H	Regioal Board Permitting Assistance	8		8		20				4						**40**	$ 11,276	$ -	$ 150	**$ 11,430**
Task 2	**Design Services**	**8**	**32**	**64**			**8**	**16**	**24**	**190**	**500**	**30**	**56**	**160**		**1088**	**$ 228,906**	**$ 57,500**	**$ -**	**$ 286,400**
A	30% Preliminary Design Submittal	2	8	12			2	4	6	40	80	8	16	20		**198**	$ 43,104	$ 5,750	$ -	**$ 48,850**
B	60% Design Submittal	2	8	20			2	4	6	60	180	8	16	60		**366**	$ 75,572	$ 28,750	$ -	**$ 104,320**
C	90% Design Submittal	2	8	20			2	4	6	60	160	8	16	60		**346**	$ 71,892	$ 17,250	$ -	**$ 89,140**
D	Final Design Submittal	2	8	12			2	4	6	30	80	6	8	20		**178**	$ 38,338	$ 5,750	$ -	**$ 44,090**
Task 3	**Bid Support**	**8**	**36**	**4**	**4**		**14**	**18**	**4**	**68**		**12**	**56**		**12**	**236**	**$ 19,534**	**$ -**	**$ 250**	**$ 58,610**
A	Bidding Support, Addenda, & Bid Review	4	8	4	4		4	8	4	8		4	8		2	**58**	$ 14,910	$ -	$ -	**$ 14,910**
B	Attend Contractor Prebid Meeting		8										8			**16**	$ 4,624	$ -	$ 250	**$ 4,870**
C	RFI Review (20 RFIs)	4	20				10	10		60		8	40		10	**162**	$ 38,834	$ -	$ -	**$ 38,830**
																			$ -	
Total (Tasks 1-3)		**48**	**100**	**82**	**4**	**32**	**28**	**48**	**28**	**272**	**500**	**52**	**124**	**160**	**12**	**1490**	**$ 315,231**	**$ 60,375**	**$ 750**	**$ 395,760**

* AQUA and SKM hourly rates for individuals shown herein include 15% markup.

8. EVIDENCE OF INSURANCE

WEBB meets or exceeds all minimum insurance requirements stipulated in the City's sample Professional Services Agreement.

ALBEAWE-01 RDEANDA

ACORD

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY) 8/28/2025

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER License # 0757776 HUB International Insurance Services Inc. PO Box 5345 Riverside, CA 92517	CONTACT NAME: Kristie Koehrer PHONE (A/C, No, Ext): (951) 779-8558 FAX (A/C, No): (951) 231-2572 E-MAIL ADDRESS: cal.cpu@hubinternational.com	
	INSURER(S) AFFORDING COVERAGE	NAIC #
	INSURER A : Travelers Property Casualty Company of America	25674
INSURED Albert A. Webb Associates 3788 McCray Street Riverside, CA 92506	INSURER B : Lexington Insurance Company	19437
	INSURER C : Lloyd's of London	15792
	INSURER D :	
	INSURER E :	
	INSURER F :	

COVERAGES CERTIFICATE NUMBER: REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY						EACH OCCURRENCE $	1,000,000
	CLAIMS-MADE X OCCUR			P-630-8W805292-TIL-25	9/1/2025	9/1/2026	DAMAGE TO RENTED PREMISES (Ea occurrence) $	300,000
							MED EXP (Any one person) $	5,000
							PERSONAL & ADV INJURY $	1,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE $	2,000,000
	X POLICY PRO-JECT LOC						PRODUCTS - COMP/OP AGG $	2,000,000
	OTHER:						$	
A	AUTOMOBILE LIABILITY						COMBINED SINGLE LIMIT (Ea accident) $	1,000,000
	X ANY AUTO			BA-9T94622A-25-43-G	9/1/2025	9/1/2026	BODILY INJURY (Per person) $	
	OWNED AUTOS ONLY SCHEDULED AUTOS						BODILY INJURY (Per accident) $	
	X HIRED AUTOS ONLY X NON-OWNED AUTOS ONLY						PROPERTY DAMAGE (Per accident) $	
							$	
A	X UMBRELLA LIAB X OCCUR						EACH OCCURRENCE $	2,000,000
	EXCESS LIAB CLAIMS-MADE			CUP-9T948494-25-43	9/1/2025	9/1/2026	AGGREGATE $	2,000,000
	DED X RETENTION $ 0						$	
A	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY						X PER STATUTE OTH-ER	
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) Y / N Y N / A			UB-4J648178-25-43-G	9/1/2025	9/1/2026	E.L. EACH ACCIDENT $	1,000,000
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE $	1,000,000
							E.L. DISEASE - POLICY LIMIT $	1,000,000
B	Professional Liab.			031711122	9/1/2025	9/1/2026	Ded $25k/EaClaim 2M	2,000,000
C	Cyber Liability			ESO0140474549	9/1/2025	9/1/2026	Ded:$2,500 / Occ/Agg	2,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)
For Informational Purposes Only.

CERTIFICATE HOLDER

For Insured's Purpose Only

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

ACORD 25 (2016/03)

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9. EXCEPTIONS AND DEVIATIONS

Albert A. Webb Associates (WEBB) has reviewed the City of Imperial's Request for Proposals (RFP 2025-18 – Final Engineering for the Influent Pump Station Upgrade at the Wastewater Treatment Plant) and the associated contract documents in their entirety.

WEBB has no technical or contractual exceptions or deviations from the requirements outlined in the RFP, nor are any alternative approaches proposed.

WEBB's proposal is fully compliant with all terms, conditions, and specifications set forth by the City.

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10. PROPOSAL ACKNOWLEDGEMENT FORM

EXHIBIT A - PROPOSAL ACKNOWLEDGEMENT FORM

The Proposer hereby acknowledges receipt of addenda number(s) 0, if any.

By signing below, the Proposer agrees to all terms and conditions in this RFP, except where expressly described in the Proposer's Services Proposal.

Original Signature by Authorized Officer/Agent

951723730
Vendor's Tax ID Number (FEIN)

Brian Knoll, PE
Type/Print Name of Signatory

Albert A. Webb Associates (WEBB)
Company Name

Chief Operations Officer
Title

951.830.3389
Phone Number

3788 McCray Street, Riverside, CA 92506
Consultant Mailing Address

951.788.1256
Fax Number

https://www.webbassociates.com/
Website Address

brian.knoll@webbassociates.com
E-mail Address

Form of Business (mark one of the following):

☐ Sole Proprietor/Individual
☐ Partnership
☒ Corporation
☐ Limited Liability Company (LLC)

If a corporation, the State where it is incorporated: California

TECHNICAL MEMORANDUM

TO:	David Dale, PE, PLS, Public Services Director, City of Imperial Jenell Guerrero, Public Services Manager, City of Imperial Chris Kemp, Chief Wastewater Operator, City of Imperial
FROM:	Justin Logan, PE, Principal, AQUA Engineering Mitchell Weldon, PE, Project Manager, AQUA Engineering
DATE:	July 22, 2025
SUBJECT:	Preliminary Engineering Report – Imperial WWTP Influent Pump Station
PROJECT NO.:	002857.C

This report memorializes existing conditions, design guidelines, potential options, and final recommendation for the City of Imperial (Imperial) Wastewater Treatment Plant (WWTP) influent pumping facility upgrade. WEBB/AQUA recommends a dry-pit pumping facility utilizing the basement of the existing sludge pumping building. We conclude by presenting implications for construction sequencing and commissioning.

INTRODUCTION

Background

The City of Imperial owns and maintains the Imperial wastewater treatment plant, located at 701 E 14th St, in the north end of the city along its eastern boundary. The facility discharges under NPDES Permit CA0104400.

The plant underwent major upgrades in 2021 to provide a membrane bioreactor (MBR) activated sludge process. Due to budget constraints, 2021 improvements excluded replacement of the existing influent lift station. Figure 1 shows the location of the existing pump station and associated electrical house (e-house) on the wastewater plant site.

Imperial is pursuing a new influent pumping facility for several purposes:

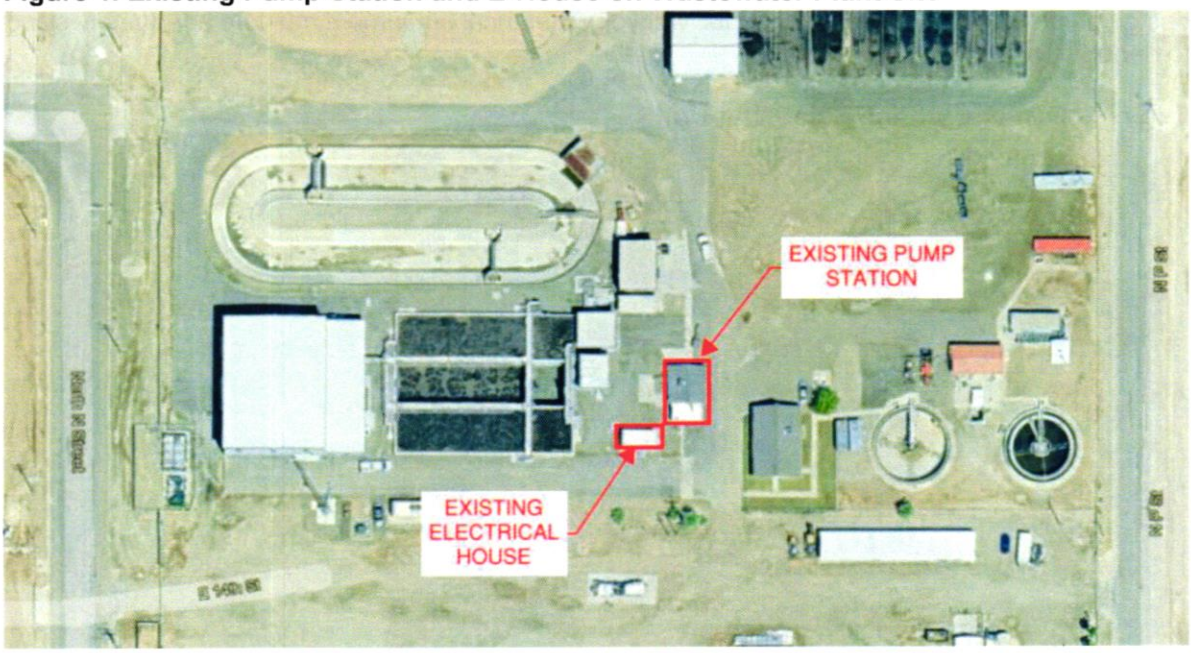
- Increase process hydraulic capacity
- Improve influent screening to protect influent pumps and downstream equipment
- Improve system redundancy and reliability
- Align with current operational requirements
- Provide a low maintenance profile and convenient access for maintenance activities
- Minimize, contain, and treat foul air to reduce odors from raw wastewater

Report Objectives

This Preliminary Engineer Report (PER) addresses the following objectives:

- Identify key infrastructure constraints
- Outline options for new plant lift station
- Provide cost estimates for Project options
- Outline critical construction sequencing and commissioning approaches

Figure 1. Existing Pump Station and E-House on Wastewater Plant Site



CURRENT CONDITIONS ANALYSIS

Current Deficiencies

The current influent pump station and downstream headworks have encountered several major concerns:

- The current pump station is the facility's hydraulic bottleneck.
- Due to a lack of screening, rags impact influent pumps and have damaged downstream fine screening units. Figure 2 shows damage to the perforated plate underneath one unit's auger.
- Hydrogen sulfide (H2S) release and high chloride levels corrode downstream infrastructure.
- Collection system diversion manholes upstream of the existing pump station have deteriorated significantly.
- Access to existing pumps and wetwell is limited by the existing building design.

Design Flows

Equipment will be sized to handle current and future flows:

- Current Average Day flow: 2.4 MGD
- Current Peak Hour Flow: 5.3 MGD
- Future Average Day Flow: 3.0 MGD
- Future Peak Hour Flow: 6.3 MGD

Designing for future flows primarily impacts equipment, pump, and pipe sizing as well as the design of hydraulic structures (channels, wetwell). Electrical equipment must be adequately sized to handle future power demands.

Figure 2. Damage to Fine Screening Unit

Existing Connections

Flow enters the existing wetwell from several directions:

- To the south, a series of manholes diverts flows from several sewer lines. It appears these manholes are severely deteriorated, and it is assumed the project will re-route influent sewer around these manholes.
- To the east, two 24-inch interceptors converge in a common manhole, with flow directed in a single line west to the wetwell. This east invert is the deepest invert into the wetwell, per available information.
- To the north, an 8-inch filtrate line enters the wet well. This line currently accepts all percolation water for the existing drying beds, the centrate water from the dewatering system, and flows from the dewatering building drains.

Existing force main piping to the fine-screening facility includes buried 14-inch C-900 PVC and an exposed ductile iron pipe (DIP) header outside of the fine screening building. At a future 6.3 mgd peak hour flow, pipe velocities in 14-inch pipe would exceed 9 FPS. With a preferred velocity below 5 FPS, upsizing of piping will be necessary. Bypass pumping will be required to finalize interconnections with new piping.

Geotechnical

A geotechnical study was completed by Landmark Consultants, Inc. on April 30, 2025. Key findings include the following considerations:

- Bores encountered groundwater at depths of 9-ft. A dewatering system will be required during construction. The structure must be designed to resist flotation.
- Structural engineering must incorporate seismic design criteria for a Site Class D with S_1 value of 0.65.
- Overexcavation of 2-ft is required for below grade structures, with subgrade replaced by drainage rock covered with a geotextile filter fabric.
- Severe sulfate ion concentrations necessitate the use of a Type V cement.
- A concrete mix design with minimum 4500 psi compressive strength is required.
- Chloride ion concentrations are also severe. No metallic water pipes or conduits should be placed below foundations.
- A 4-inch edge distance to reinforcing bar within concrete should be maintained, otherwise embedded steel components shall be epoxy coated for corrosion protection.

In general, geotechnical observations do not differ from previous understanding of site soil conditions. Site soils are corrosive – buried infrastructure must be appropriately selected and adequately protected to ensure a long service life.

DESIGN GUIDELINES FOR SCREENING AND PUMPING

The following subsections detail design considerations common to the development of both headworks facility options.

Materials of Construction

High chlorides and hydrogen sulfide in Imperial's influent wastewater contribute to accelerated corrosion of metals. Influent testing has yielded the following concentrations:

Ion	Reading 1	Reading 2
Chloride	310 mg/L	380 mg/L
Sulfide	30 mg/L	34 mg/L

For all metal fabrications, appropriate alloys must be selected to avoid rapid corrosion. 304 stainless steel suffices for chloride levels below 100 mg/L but experiences "pitting" above this concentration, which has been observed at the treatment facility. Therefore, stainless steel shall be at minimum 316, which better resists chloride pitting due to the addition of 2-3% molybdenum. During final design, Webb/AQUA will evaluate critical components for available material selections that offer corrosion protection exceeding that of 316 SS (e.g. duplex stainless steel).

Within the wet well and screening facility, nonmetallic options shall be provided when appropriate:

- FRP covers for screening channels and wetwell
- Vinyl ester unistrut for conduit support

Screening

Design of new screening facilities, prior to influent pumps, should adhere to the following requirements:

- Screening must remove solids to reduce pump ragging and adequately protect downstream equipment.

  - Recommend screening openings of ¼-inch
- Screening must have built-in redundancy.
  - Two units are recommended, each sized at 100% of flow. For the design flows and other constraints, upsizing from 50% to 100% redundancy does not appreciably increase project cost.
  - Provide a passive overflow channel with manual bar screen in case of failure of both screens.
- Screening must provide for convenient disposal of solids
  - Screenings must discharge at grade level for ease of subsequent hauling.
  - Compactor unit provided to reduce total disposal volume and decrease required hauling frequency.
- Screening facilities must minimize resulting odors:
  - Screening unit will include washer and compactor to return excess organics to the influent wet well. Washing of screenings will reduce odors.
  - Screening channels and downstream wetwell shall be covered. An odor control system shall remove air from beneath the covers and scrub it prior to release to atmosphere.
- Protection of exposed infrastructure
  - Provide a metal awning with siding on the west side to protect equipment from accelerated UV degradation, dust, and debris.

Pumping

WEBB/AQUA recommends that pump design adhere to the following guidelines:

- Design pumps to be solids-handling. While upstream screening will reduce ragging concerns, there is a chance of solids agglomeration in the wet well.
- Provide N+1 redundancy to maintain system operation in the case of a single pump failure.
- Select pump materials appropriate for corrosive service:
  - Stainless steel impeller recommended in lieu of cast iron.
  - Heavy-duty external coatings for submersible pumps
  - WEBB/AQUA is aware of abrasive materials (grit) in the influent. Excess abrasives may justify a different material selection for the impeller. Final material selections will be made in consultation with pump manufacturers.
- Operate pumps on variable frequency drives to reduce pump starts and minimize wastewater detention times in the wetwell.

Corrosion Protection

To protect downstream equipment (fine screens) from corrosion, the following equipment is recommended:

- Channel and wetwell covers
- Odor control system
- Wetwell aeration
- Coatings

Developed design options include an odor control system to scrub foul air from underneath screening channel and wetwell covers. The system will use either a carbon media scrubber or biotrickling filter to reduce potential facility odors. By exchanging air at the interface with raw sewage, the system will also encourage further H2S volatilization and removal.

A coarse bubble aeration system is also proposed to provide several benefits:

- Wetwell mixing to promote volatilization of H2S and subsequent removal by the odor control system.
- Addition of oxygen to mitigate anaerobic conditions which favor the bacteria that reduce sulfate to sulfide
- Promotion of sulfur-oxidizing bacteria to convert aqueous sulfides to sulfate ions.

The City of Imperial has recently purchased a Fog Log (Risen Water) aerator for use in H2S reduction in the collection system. The vendor recommends 2 Fog Log units to adequately mix the proposed wetwell.

Finally, concrete and piping will have appropriate coatings to resist sulfide corrosion. WEBB/AQUA recommends a 100% solids thick film coating for the concrete exposed to the interior airspace of the screening facility (Tnemec Perma-Glaze Series G435 or equal).

Screening Vault Requirements

Influent sewer depths necessitate a below-ground structure for screening channels and the pump wetwell. Several ancillary building design recommendations are summarized below:

- Minimize equipment placed below grade. Motors, control panels, and other equipment should be placed above grade to reduce exposure to a corrosive environment.

- Provide improved maintenance access to wetwell:

    - Stairwell to screening floor
    - Improved clearances within screening floor
    - FRP cover system with hoists to remove panels for unobstructed wetwell access.

- Provide exhaust fans and supply vents to reduce humidity and remove gases that have bypassed channel covers and the odor control system. Ventilation design may provide continuous ventilation or only when personnel are present.

- Provide combustible gas detectors (CGDs) to comply with NFPA 820.

- Provide a metal awning to cover critical equipment at grade level. The awning will reduce UV exposure and provide a more comfortable work environment for maintenance activities. Provide siding on the west side of the awning to protect equipment from afternoon sun as well as prevailing winds and associated debris.

OPTION 1 – SUBMERSIBLE PUMPS

Description

This option consists of a new screening facility and wetwell to be located at the Operations Building site. See Attachment 1 for a basic site plan, plan views, and section view of the concept.

The following points summarize the screening configuration:

- Influent sewer depths necessitate a below-grade screening floor. Three channels will direct influent wastewater to the wetwell.
- Two channels are screened by mechanical screening equipment, which discharge screenings to the upper level at grade.
    - The third channel has a manual bar screen and is normally isolated with an overflow weir gate, so that it only operates under emergency conditions.
- Per design guidelines above, the screens are sized such that each screen can independently handle the future peak hour flow (6.3 MGD). This approach will minimize bypass through the manual screen.

The screening channels discharge directly to the wetwell, which is preliminarily sized at 20'x8'x8'. Within the wetwell sit 4 submersible centrifugal, non-clog pumps. These pumps are sized for 3 duty, 1 standby (3+1) configuration to handle 6.3 MGD. The pumps will have discharge elbow bases and guide rails for retrieval. They can be retrieved from the wetwell using a monorail installed at grade level above the wetwell.

The screening channels and wetwell will be enclosed with FRP covers. The airspace underneath the covers will be ventilated to remove odors, with foul air passing through a carbon media or biological odor control system located at grade. Additionally, a type of aeration will be added to the influent channels or wet well to help reduce sulfides in the wastewater and strip them out of solution in an effort to reduce downstream corrosion potential. This will also be removed with the foul air to the odor control system.

Screenings will discharge at grade to washer/compactor units. Washing reduces organic content of screenings, with resulting benefits for odor control and screening volume.

Discharge piping from the pumps will exit the facility at the grade level and combine in an above-ground discharge header adjacent to the structure. The discharge line to the existing headworks will be buried and is preliminarily sized at 18-inches.

Equipment

For mechanical screening, a multi-rake screen was evaluated in the preliminary evaluation for the following reasons:

- Ability to convey solids to a high discharge point.
- High degree of inclination reduces horizontal footprint of the unit.
- Washer/compactor units are available as an integrated package.
- Multiple vendors are available to provide a competitive bidding process.

Odor control evaluated carbon media, chemical, and biological scrubbers. Preliminary evaluation yielded the following conclusions:

- Air stripping will be provided in the influent channels or wet well. This technology will be determined during the design phase.
- A chemical scrubber has increased maintenance profile and operating costs compared to the other options and is not considered further.
- A carbon media scrubber has a lower capital cost than a biological system but faces recurring costs of media replacement.
- A biological system (biotrickling filter) has large capital costs but recurring O&M expenses is limited to power and water.

Further evaluation and selection of odor control technology is anticipated during final design.

Site Constraints and Electrical Design Considerations

Option 1 necessitates full demolition of the existing Operations Building.

Due to its proximity to the new facility, the existing electrical house can be re-used for housing electrical and controls equipment. The existing PLC can be switched over to control the new pumps, with only minor modifications necessary to add control capabilities over the fourth proposed pump. Preliminary evaluation of power demands suggests the distribution panel feeding the existing e-house is of sufficient size to power new equipment for Option 1.

The three existing pump VFDs can also be maintained in the e-house. WEBB/AQUA recommends evaluating procurement of two new VFDs – one for the 4th pump, and an additional to facilitate pump clean water testing and switchover operations. During final design, the existing shelf spare VFD will be evaluated for use as one of the new VFDs required. Following switchover, two of the existing VFDs can be rewired one by one to the new pumps, and the final existing VFD can serve as a spare.

Cost

A preliminary cost estimate has been developed equivalent to AACE Level 3 "Budgetary" cost estimate. The expected range of accuracy for this level of cost estimate is -20% to +30%. The overall project cost (including design and construction management) with a 30% contingency is estimated at $6,450,440. See Attachment 1 for a cost estimate broken out by division.

This cost includes an estimated cost for demolishing the Operations Building. WEBB/AQUA understands that Imperial will soon receive pricing for Operations Building removal – that pricing can then be figured into the City's final evaluation.

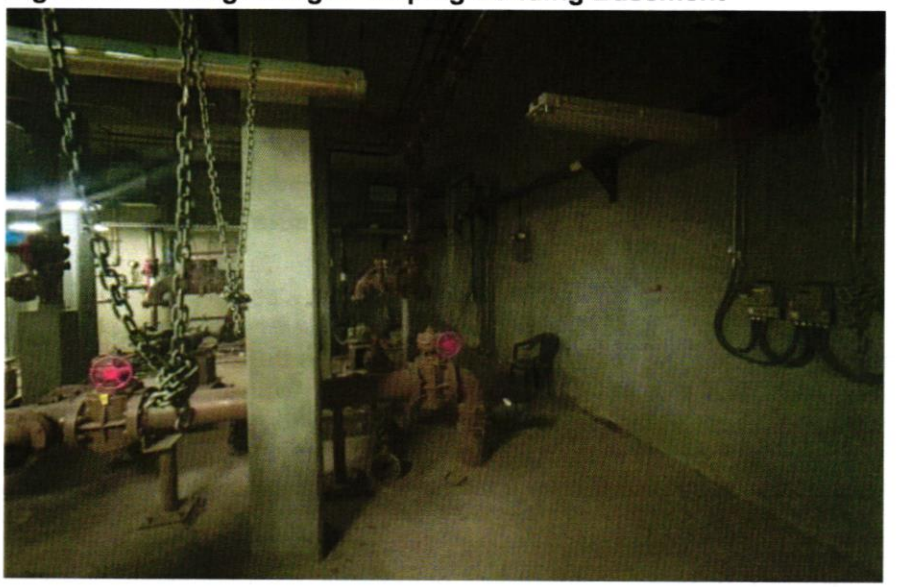
OPTION 2 – DRY-PIT PUMPS

Description

Option 2 consists of a screening facility and wetwell similar to Option 1. However, this option offers a dry-pit pumping configuration, which will allow direct access to pumps and pump motors for regular maintenance activities. See Attachment 2 for a basic site plan, plan views, and section view of the concept.

To reduce the capital costs associated with a dry pit, WEBB/AQUA proposes siting the wetwell adjacent to the west side of the existing Sludge Pumping Building. The basement floor of the existing building would be used to house the dry pit pumps and discharge header. Figure 3 shows the wall adjacent to which the new pumps would be installed. Most equipment in the Sludge Pumping Building is no longer in use and can be removed to provide space for the dry pit pumps.

Figure 3. Existing Sludge Pumping Building Basement



By placing the new structure adjacent to the west side of the sludge pumping building, site demolition work should be minimized.

Other main differences compared to Option 1 are listed below:

- Demolition work will be required within the existing Sludge Pumping Building to remove piping and equipment that is no longer in use.
- WEBB/AQUA recommends upgrades to the existing HVAC system at the Sludge Pumping Building to ensure NFPA-compliant controls and alarming are in place. Some existing HVAC equipment is within the basement level, and it is recommended to replace this with equipment mounted on the exterior concrete lid.
- No monorail or grating on the top level of the screening facility is required for pump retrieval.
- Greater lengths of influent sewer piping and additional manholes will be required to route influent sewer to this location on site.
- Force main piping to the fine screens will be of greater length.

Equipment

Screening and odor control equipment remains the same as Option 1. Overall screening facility and wetwell sizing will be approximately the same.

Given sewer invert elevations, dry-pit pumps must be capable of pulling a suction lift. As such, a self-priming model is recommended. Pump impellers and volute design shall be non-clog to handle solids which bypass the coarse screens.

New, exterior-mounted HVAC equipment is recommended for the sludge pumping building basement, to provide sufficient air exchanges in accordance with NFPA 820 as well as cooling to condition the space during hot weather.

Site Constraints and Electrical Design Considerations

Option 2 does not require the demolition of the existing Operations Building. Demolition of the west secondary clarifier (Clarifier #1), including removal of below-grade concrete, is required. However, per City workshop held on May 30, 2025, this clarifier demolition is likely to be pursued in either case. Therefore, the cost of clarifier and associated infrastructure demolition is not considered in the evaluation of Option 2.

With the demolition of Clarifier #1, there are no known existing facilities that would substantially impact the installation of the new screening and wetwell structure.

The electrical room on the top floor of the sludge pumping building would house electrical and controls equipment for Option 2. Preliminary power demand evaluation suggests that the 300-amp service to this electrical room is adequate for the new equipment. However, if pump power requirements increase significantly above the initial estimate (25 hp per pump), a new breaker and larger wire to the service may be required. The pending removal of the UV equipment loading from this service will increase power available for the new equipment.

Compared to the e-house, Option 2 will require additional electrical and controls wiring. The existing PLC (for the now-defunct RAS, WAS, and NPW pump systems) may have a reusable cabinet, but it will require new internals. Per Chris Kemp, the existing Motor Control Center (MCC) is in good condition and has ample buckets for new equipment. Re-use of these two pieces of equipment is estimated to save $30,000 in construction costs. The condition of other existing gear identified for potential reuse will be verified during final design.

Existing VFDs in the e-house could theoretically be moved and re-installed, but two new VFDs are likely required anyway for testing and startup (if the shelf spare VFD is installed, only one new VFD is required). The sequencing and switchover process adds additional complications – compared to an estimated $20,000 per VFD panel, reuse of the existing VFDs may not be worth additional constructability concerns. WEBB/AQUA recommends acquiring four new VFDs (three if the existing shelf spare may be used) instead. These differences between Option 2 and Option 1 are reflected in greater estimated Option 2 EI&C costs.

Access modifications to the electrical room and stairwell to the sludge pumping building basement will be made so that access to the dry-pit pumps does not require access to the electrical room.

Cost

Compared to Option 1, major items reducing and increasing costs for Option 2 are presented below:

Cost Reduction
- No monorail for pump retrieval
- Reduced pump costs
- No demolition of Operations Building

Cost Increase
+ Demo work within Sludge Pump Building
+ HVAC upgrades to Sludge Pump Building
+ Additional electrical gear including VFDs
+ Additional controls work including new PLC internals and HVAC controls
+ Additional discharge header piping
+ Additional piping supports and coating
+ Additional influent sewer piping and manholes (deep trenching)
+ Additional force main piping

Estimated cost for this option (with 30% contingency) is **$6,897,100**, or $446,660 greater than Option 1. Increased costs are largely driven by the additional electrical and controls scope anticipated for this option.

RECOMMENDATION

Option 2, the dry-pit pumping arrangement is recommended for several reasons:

(1) Equipment access: pumps and motors are accessible without hoisting from wet well.
(2) Maintenance:
    a. Ease of inspection and access promotes improved preventative maintenance.
    b. Greater number of maintenance activities can be performed by operators on-site without need for shipping to a manufacturer's service shop.
    c. Critical issues such as seal failure do not lead to total motor failure.
(3) Avoids demolition of the existing Operations Building.

The operational advantages of Option 2 should be considered against the greater anticipated costs in guiding the City's final decision.

COMMISSIONING STRATEGY

A multi-step commissioning procedure will be implemented to ensure that new equipment is functioning properly before hand-over to Imperial staff is completed. Commissioning of equipment will proceed in three main steps:

(1) Pre-commissioning work: activities to be completed before the Contractor is permitted to begin Commissioning. The intent is to test isolated equipment and components. Primary activities for this phase include:
    a. Factory testing
    b. Component and stand-alone equipment testing
    c. Energization of electrical power distribution equipment
    d. Pipe pressure testing
    e. Loop testing
    f. Operational Readiness Tests to verify that all parts of a system are in working order and functioning properly.
    g. Draft O&M Manuals Submitted and Approved.

(2) Phase 1 Commissioning: the first phase of Commissioning will include operator training as well as comprehensive testing with clean water.
   a. The steps will include approval of Operational Readiness Tests and the Functional Acceptance Test (FAT).
   b. The purpose of the FAT is to test all equipment, instruments and software as an integrated system using plant water wherever applicable.
      i. The successful completion of the Functional Acceptance Test will allow the Contractor to request Operational Acceptance.
   c. FAT tests will be conducted using clean water, which can then be recycled back to the wetwell.

(3) Phase 2 Commissioning is designed to functionally test the facility as an integrated system under normal operating conditions using wastewater. The testing includes the Reliability Acceptance Test (RAT) that will be conducted over a period of time that demonstrates the operational reliability of the system.
   a. For Coarse Screening and Influent Pumping, a 30-day RAT period is recommended.
   b. Wastewater will be introduced by starting the bypassing and diversion process of the existing influent diversion manholes, with flow entering the new sewer piping to the influent screening channels.
   c. After successful completion of the RAT and all Manufacturers' Certificates of Proper Operation have been submitted to Engineer, and after the Contractor has submitted all Operation and Maintenance Manuals, the Contractor may request the Owners' acceptance that the system is Substantially Complete.

CONSTRUCTION SEQUENCING

Evaluation of construction sequencing requirements is summarized below:

- Construction of the new screening and wetwell structure does not impact existing facilities and has no preceding tasks.
- New sewer and force main piping should be laid prior to switchover, apart from final interconnections .
- Temporary bypass pumping will be required when upsizing the force main discharge header to the fine screens.
- Temporary bypass pumping will be required during sewer line diversions, from a manhole upstream of the diversion point.
- If VFDs are reused, While the existing pump station and pump VFDs remains in operation, one or two new VFDs will first be installed for the new pumps. Clean water testing may occur using the pumps connected to the VFDs. Then, after flow has been diverted to the new pump station, switchover of existing VFDs may occur sequentially.
- If four new VFDs are provided, then clean water testing may occur using the complete set of pumps. Switchover will not require sequential reinstallation of VFDs.
- Following completion of the RAT, demolition activities at the existing pump station may begin.

FACILITY PERMITTING

Webb/AQUA recommends that the new pump station be considered as a replacement of existing facilities with no resulting change to the plant capacity. As a replacement, only a CEQA exemption would be required for the project.

When the City proposes to increase the permitted capacity of the Imperial WWTP and processes a permit amendment, Webb/AQUA will investigate if a CEQA document was prepared for the City's General Plan that would handle growth inducement impacts. If a CEQA document exists, the opportunity may exist to use it to satisfy the CEQA requirements relating to growth, and the CEQA document for the new pump station can simply address the localized impacts of construction.

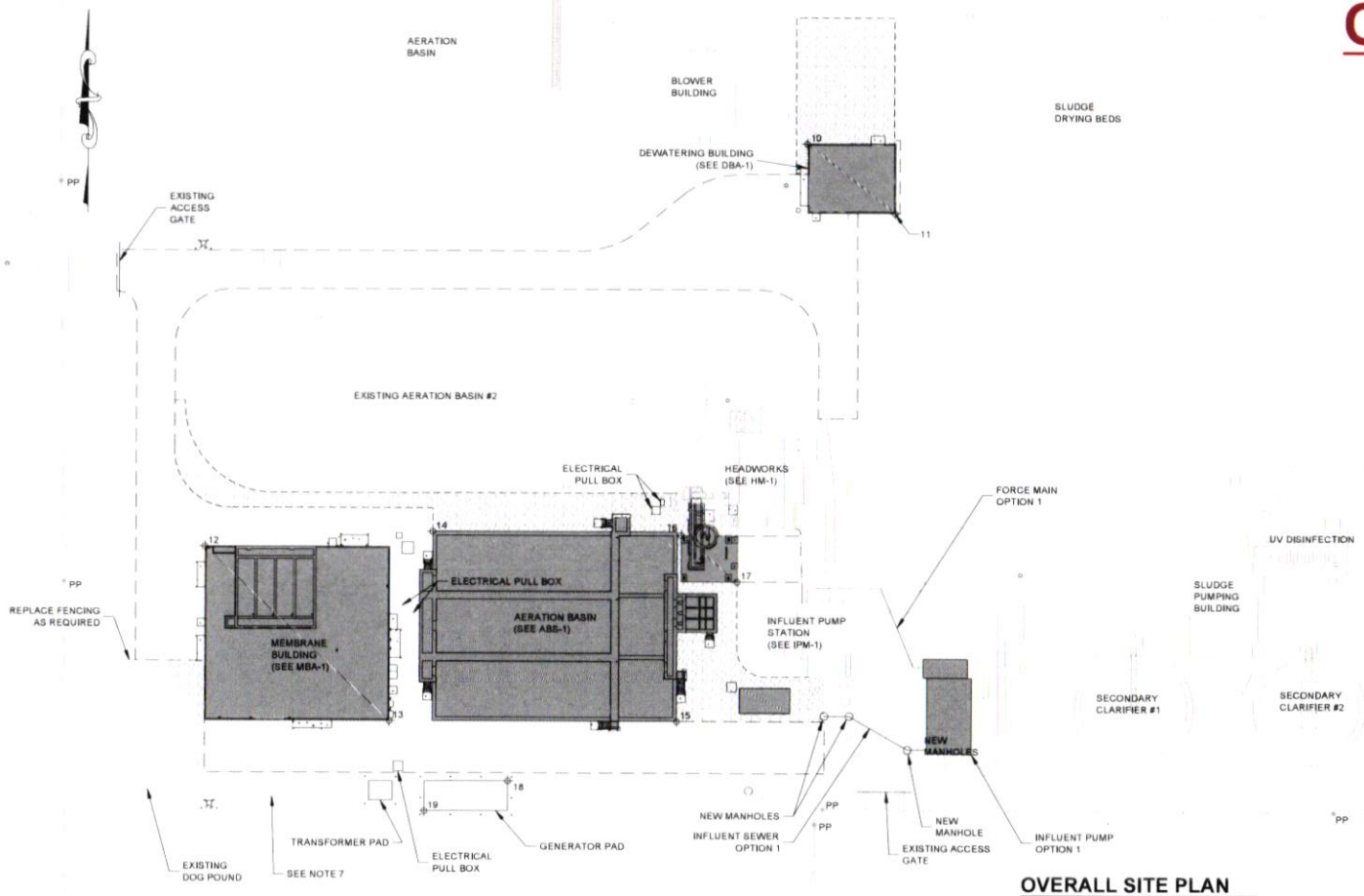
ATTACHMENTS

- Attachment 1: Option 1 Site Plan, Mechanical Plan and Section, and Cost Estimate
- Attachment 2: Option 2 Site Plan, Mechanical Plan and Section, and Cost Estimate
- Attachment 3: "Limited Geotechnical Report, Proposed Headworks at Imperial WWTP. LCI Report No. LE25072." Landmark Consultants, Inc. April 30, 2025.

ATTACHMENT 1

Option 1 Site Plan, Mechanical Plan and Section, and Cost Estimate

OPTION 1



OVERALL SITE PLAN

SCALE: 1"=30'-0"

0 30 60

Scale in Feet

CITY OF IMPERIAL

HEADERWORKS CONCEPT SITE PLAN OPTION 1

AQUA ENGINEERING

DRAWING NO.

C-1

SHEET

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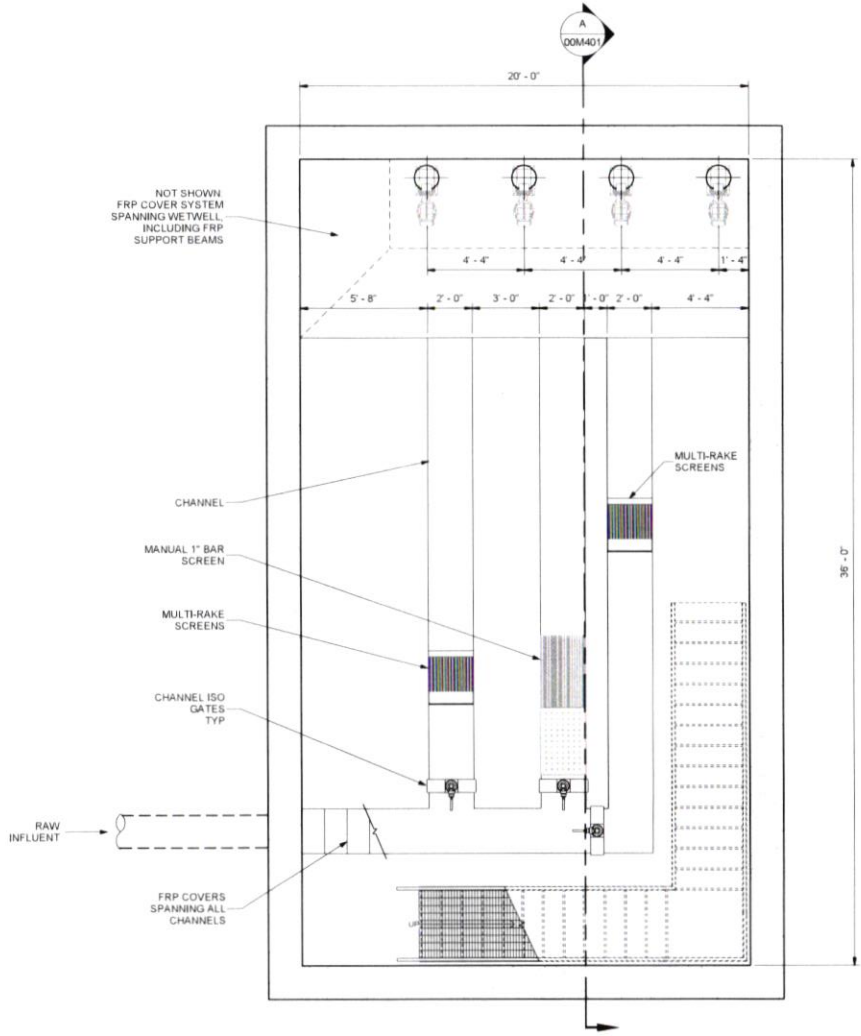

PLAN

3/8" = 1'-0"

DRAWING IS TO SCALE IF BAR MEASURES
1" = FULL SCALE
1/2" = HALF SCALE

0 1/2 1

ORIGINAL

NO.	DATE	DESIGN	DRAWN	CHECKED
0	06/06/2021	Designer	Author	Checker

REVISIONS

NO.	DATE	DESIGN	DRAWN	CHECKED

IMPERIAL HEADWORKS CONCEPT

Location

AQUA ENGINEERING

DRAWING NO.

00M201

SHEET

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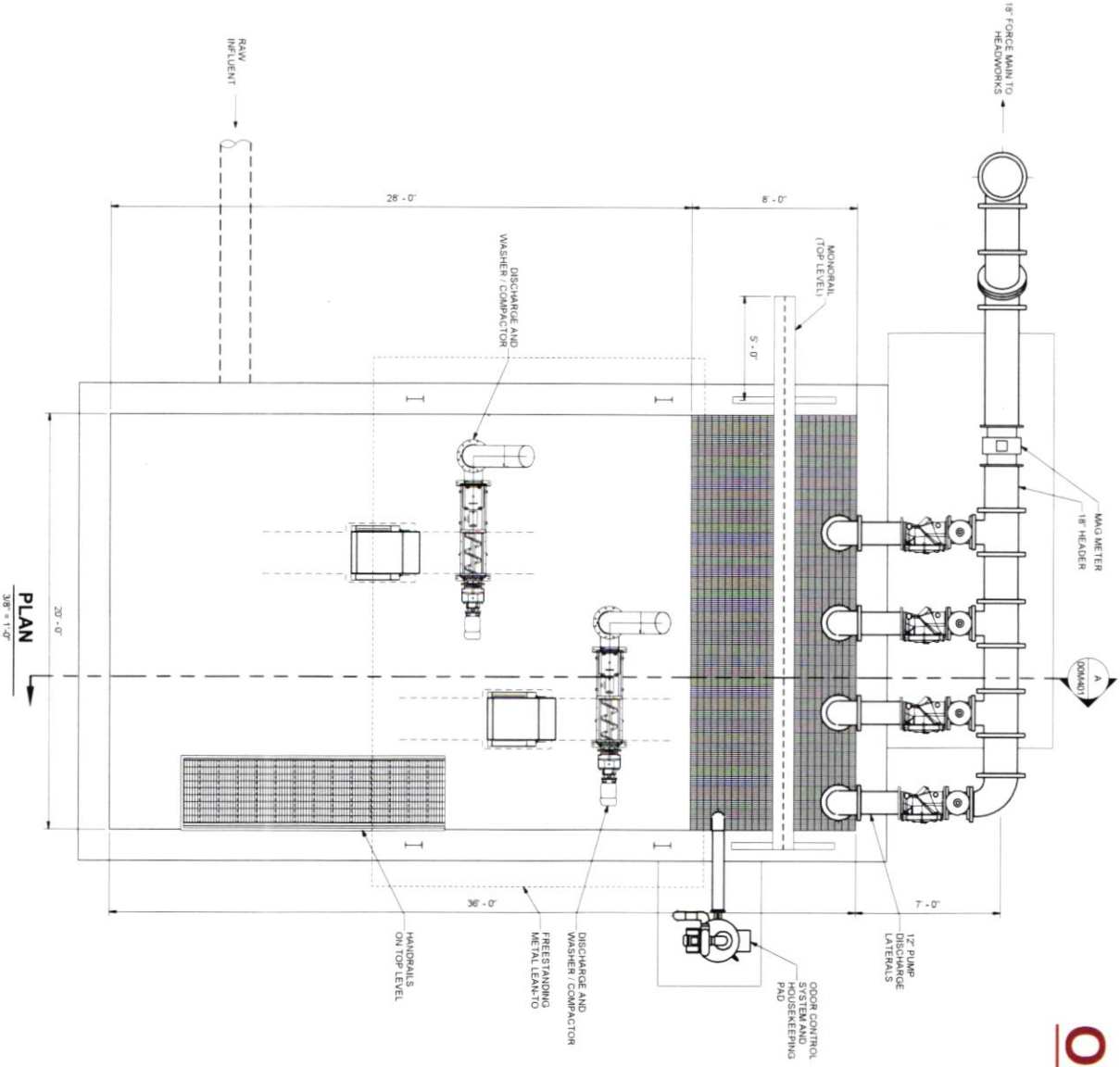

OPTION 1

IMPERIAL HEADWORKS CONCEPT

Location

0 1/2 1

DRAWING IS TO SCALE IF BAR MEASURES: 1" = FULL SCALE, 1/2" = HALF SCALE

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REVISIONS				
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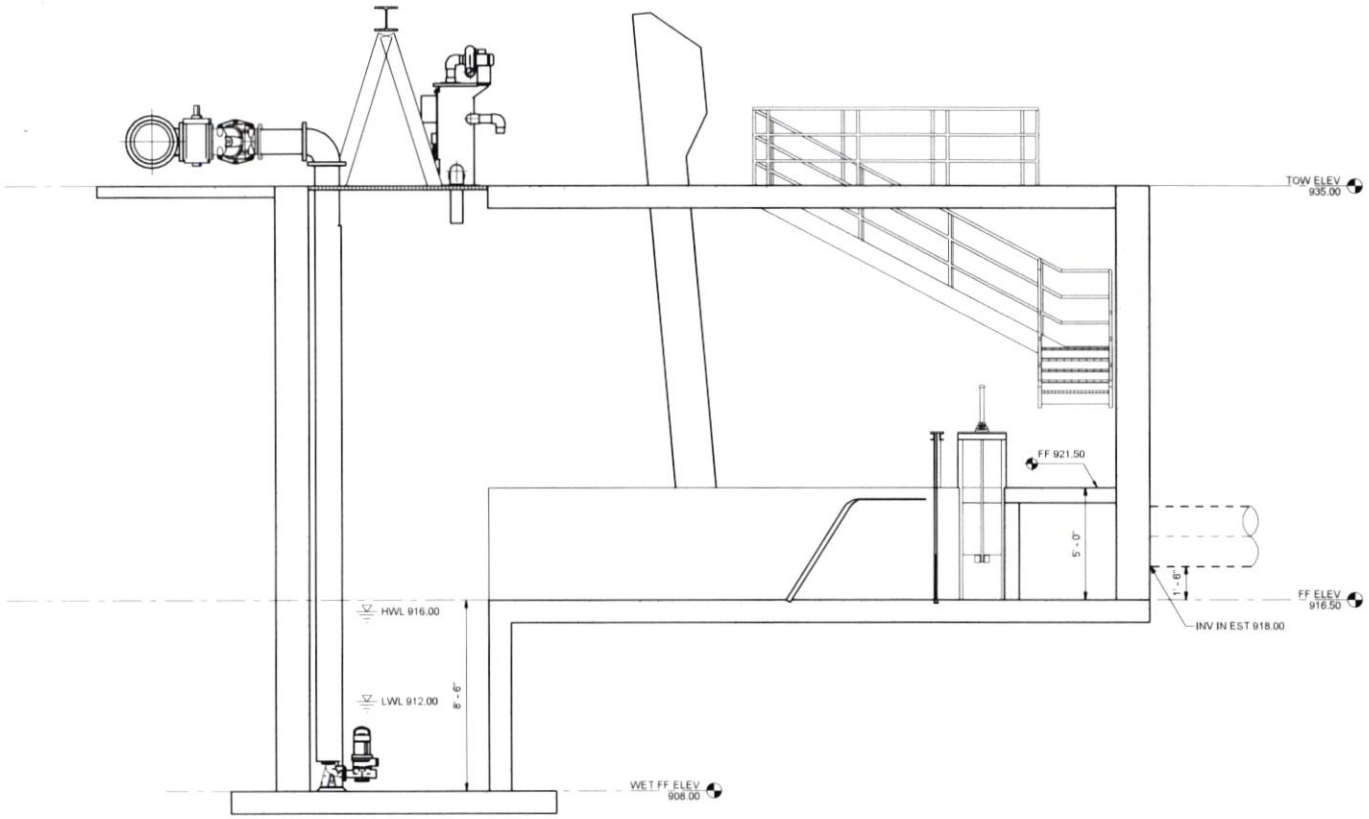
AQUA ENGINEERING

DRAWING NO. 00M202

SHEET

OPTION 1



A / 00M201 **SECTION**
3/8" = 1'-0"

DRAWING IS TO SCALE IF MARGINS ARE 1" = FULL SCALE 1/2" = HALF SCALE

ORIGINAL
DESIGN | DATE | DRAWN | CHECKED
Designer | Author | Checker

REVISIONS
NO. | DATE | DESIGN | DRAWN | CHECKED
1 | 05/06/2021

IMPERIAL HEADWORKS CONCEPT
Location

AQUA ENGINEERING

DRAWING NO.
00M401

SHEET

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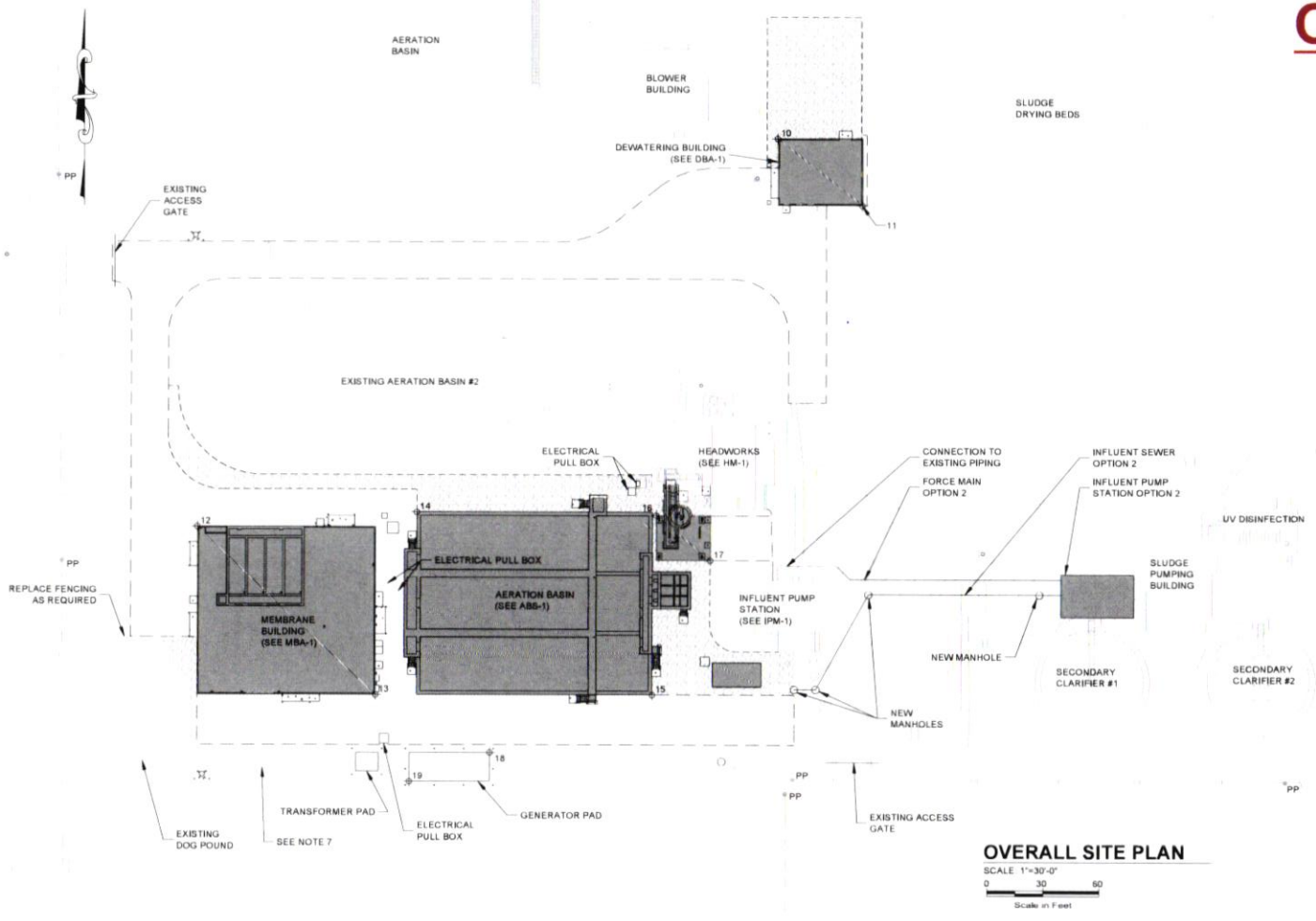
Option 1 (Submersibles) Cost Estimate

Division	Cost, $
Div. 2 Existing Conditions	$53,430
Div. 3 Concrete	$281,840
Div. 4 Masonry	$0
Div. 5 Metals	$96,800
Div. 6 Woods, Plastics, and Composites	$81,000
Div. 7 Thermal and Moisture Protection	$3,750
Div. 8 Openings	$0
Div. 9 Finishes	$115,000
Div. 10 Specialties	$0
Div. 13 Special Construction	$20,000
Div. 22 Plumbing	$5,000
Div. 23 HVAC	$21,500
Div. 26 Electrical	$610,830
Div. 31 Earthwork/Civil	$351,370
Div. 32 Exterior Improvements	$150,850
Div. 33 Utilities	$56,000
Div. 40 Process Integration	$183,080
Div 41. Material Processing and Material Handling	$44,620
Div. 43 Liquid and Solids Handling Equipment	$456,810
Div 44. Pollution Control Equipment	$55,000
Div 46. Water and Wastewater Equipment	$1,078,050
SUBTOTAL A - Inflated	**$3,640,000**
Div. 1 General Conditions (7.5%)	$273,000
Bond/Insurance	$54,600
Contingency (30%)	$1,092,000
Contractor's Overhead & Profit (10%)	$505,960
TOTAL CONSTRUCTION COST, 2023 DOLLARS	**$5,565,600**
Engineering Planning and Design	$417,420
Engineering Bidding and Construction	$417,420
Materials Testing	$50,000
TOTAL PROJECT COST, 2023 DOLLARS	**$6,450,440**

ATTACHMENT 2

Option 2 Site Plan, Mechanical Plan and Section, and Cost Estimate

OPTION 2



OVERALL SITE PLAN

SCALE 1"=30'-0"

0 30 60

Scale in Feet

CITY OF IMPERIAL

HEADWORKS CONCEPT SITE PLAN OPTION2

DRAWING IS TO SCALE IF BAR MEASURES 1" = FULL SCALE 1/2" = HALF SCALE

ORIGINAL

DESIGN | DRAWN | CHECKED

NO | DATE | REVISIONS

AQUA ENGINEERING

DRAWING NO.

C-1

SHEET

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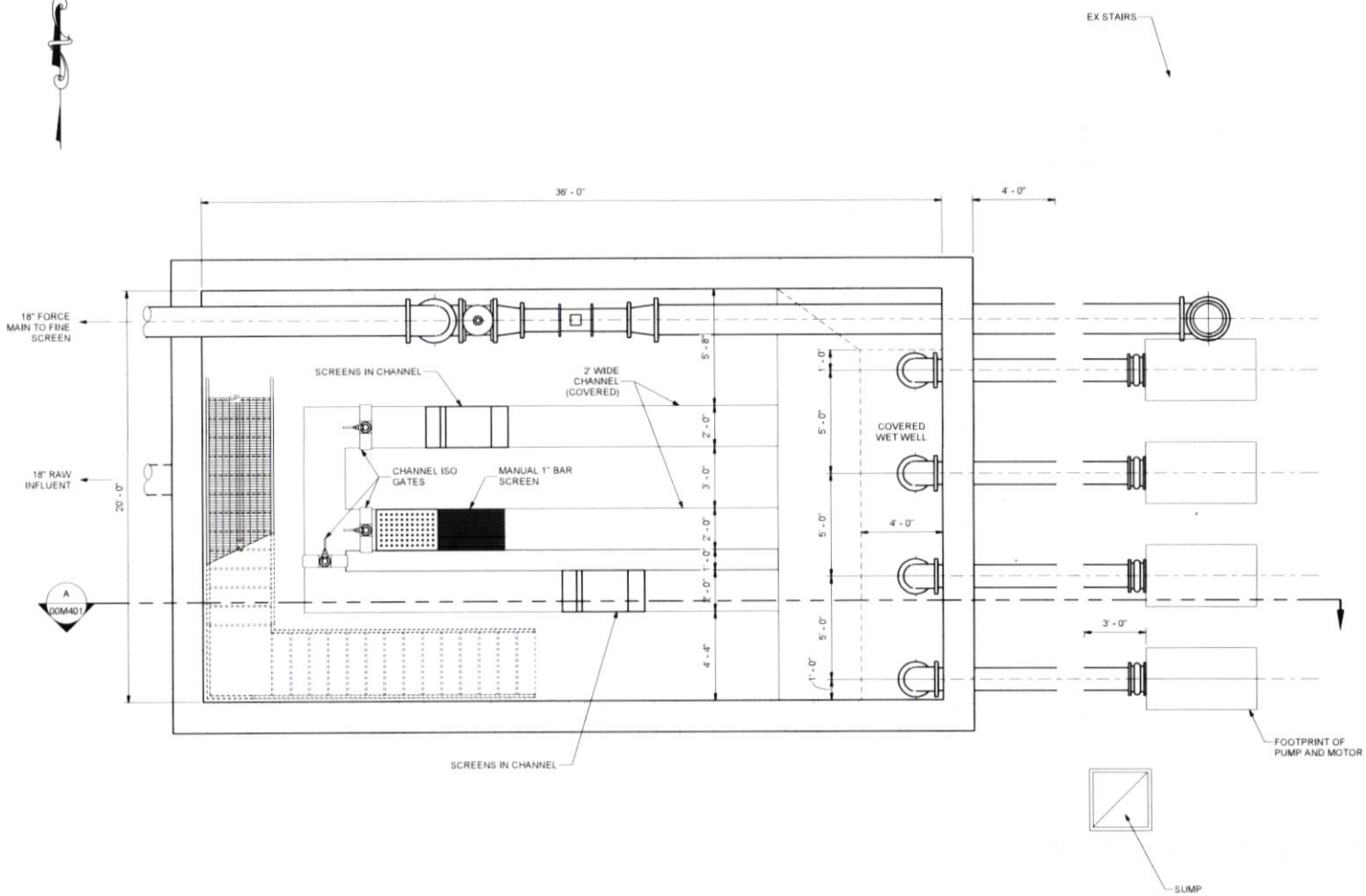
OPTION 2



PLAN
3/8" = 1'-0"

DRAWING IS TO SCALE IF BAR MEASURES
1" = FULL SCALE
1/2" = HALF SCALE

NO.	DATE	ORIGINAL	DRAWN	CHECKED
		DESIGN	Author	Checker

NO.	DATE	REVISIONS	DRAWN	CHECKED
1	06/06/2025	Designer		

IMPERIAL HEADWORKS CONCEPT
Location

AQUA ENGINEERING

DRAWING NO.
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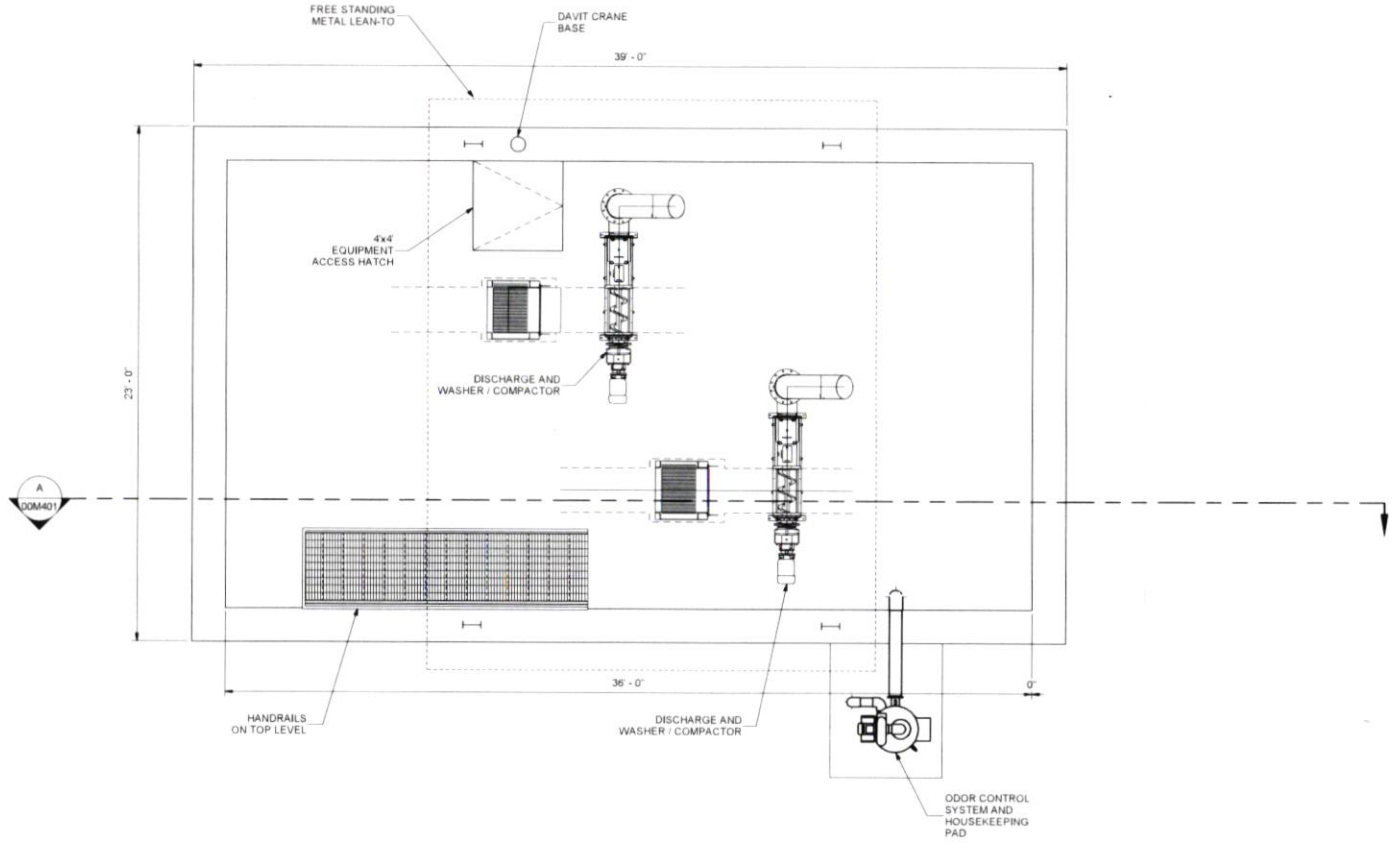
OPTION 2



PLAN
3/8" = 1'-0"

DRAWING IS TO SCALE IF BAR MEASURES 1" = FULL SCALE 1/2" = HALF SCALE

ORIGINAL

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REVISIONS

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IMPERIAL HEADWORKS CONCEPT
Location

AQUA ENGINEERING

DRAWING NO.
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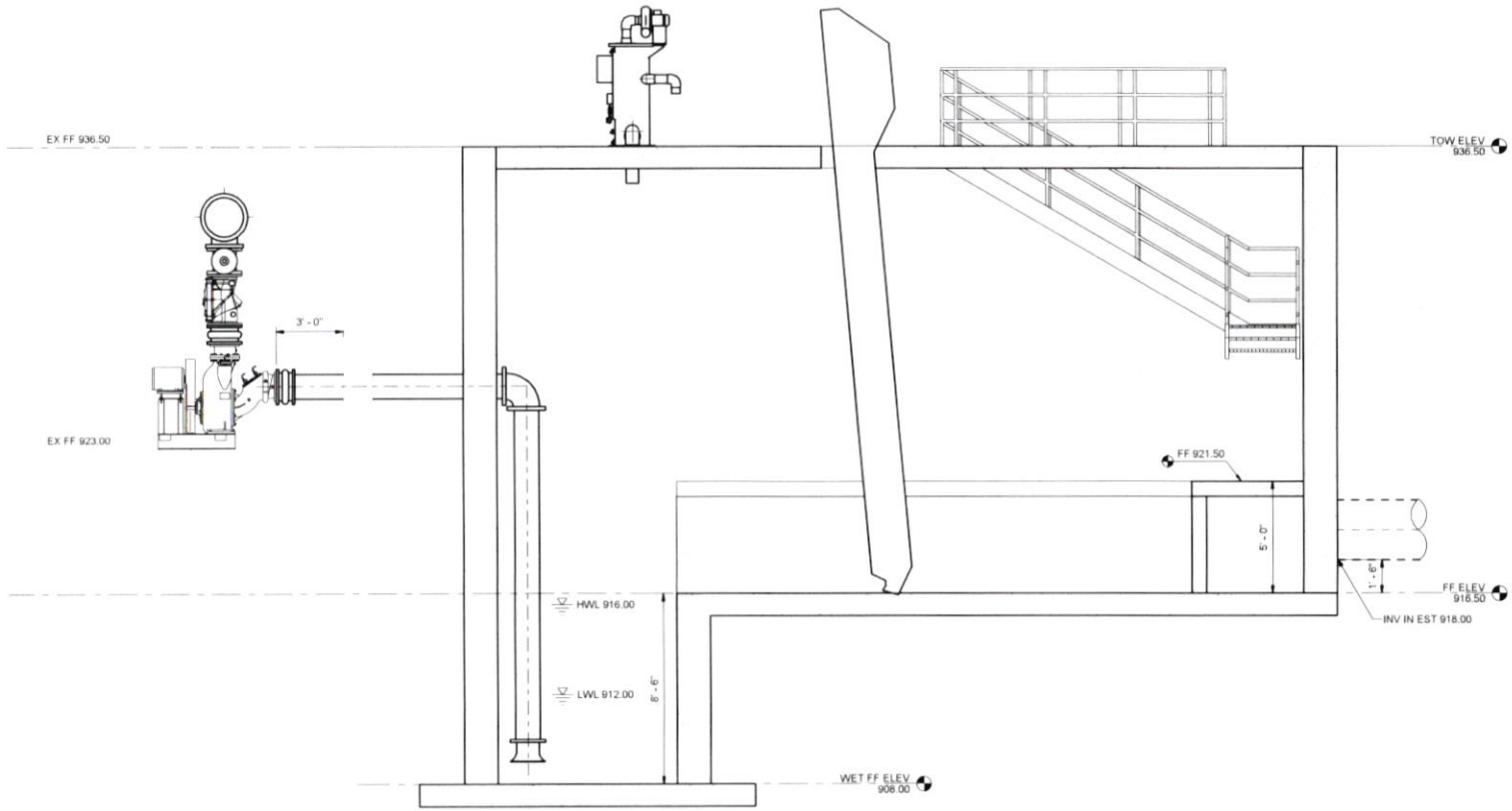
OPTION 2



A 00M201 **SECTION**
3/8" = 1'-0"

DRAWING IS TO SCALE IF MARGINS ARE 1" = FULL SCALE 1/2" = HALF SCALE

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REVISIONS				
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IMPERIAL HEADWORKS CONCEPT
Location

AQUA ENGINEERING

DRAWING NO.
00M401

SHEET

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Option 2 (Dry Pit) Cost Estimate

Division	Cost, $
Div. 2 Existing Conditions	**$52,970**
Div. 3 Concrete	**$285,840**
Div. 4 Masonry	$0
Div. 5 Metals	$96,800
Div. 6 Woods, Plastics, and Composites	$81,000
Div. 7 Thermal and Moisture Protection	$3,750
Div. 8 Openings	$0
Div. 9 Finishes	**$120,000**
Div. 10 Specialties	$0
Div. 13 Special Construction	$20,000
Div. 22 Plumbing	$5,000
Div. 23 HVAC	**$41,500**
Div. 26 Electrical	**$916,940**
Div. 31 Earthwork/Civil	$351,370
Div. 32 Exterior Improvements	$150,850
Div. 33 Utilities	**$119,500**
Div. 40 Process Integration	**$208,280**
Div 41. Material Processing and Material Handling	**$4,620**
Div. 43 Liquid and Solids Handling Equipment	**$302,500**
Div 44. Pollution Control Equipment	$55,000
Div 46. Water and Wastewater Equipment	$1,078,050
SUBTOTAL A - Inflated	**$3,894,000**
Div. 1 General Conditions (7.5%)	$292,050
Bond/Insurance	$58,410
Contingency (30%)	$1,168,200
Contractor's Overhead & Profit (10%)	$541,270
TOTAL CONSTRUCTION COST, 2023 DOLLARS	**$5,954,000**
Engineering Planning and Design	$446,550
Engineering Bidding and Construction	$446,550
Materials Testing	$50,000
TOTAL PROJECT COST, 2023 DOLLARS	**$6,897,100**

ATTACHMENT 3

"Limited Geotechnical Report, Proposed Headworks at Imperial WWTP. LCI Report No. LE25072."
Landmark Consultants, Inc. April 30, 2025.

Limited Geotechnical Report

Proposed Headworks
Imperial WWTP
Imperial, California

Prepared for:

Albert A. Webb & Associates
3788 McCray Street
Riverside, CA 92506

LANDMARK
Geo-Engineers and Geologists

Prepared by:

Landmark Consultants, Inc.
780 N. 4th Street
El Centro, CA 92243
(760) 370-3000

April 2025

LANDMARK
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April 30, 2025

Mr. Brian Knoll, PE
Albert A. Webb Associates
3788 McCray Street
Riverside, CA 92506

Geotechnical Report
Proposed Headworks at Imperial WWTP
720 E. 14th Street
Imperial, California
LCI Report No. LE25072

Dear Mr. Knoll:

This geotechnical report is provided for design and construction of the proposed improvements to the existing Imperial Wastewater Treatment plant located at 720 E. 14th Street in northeast Imperial, California. Our geotechnical exploration was conducted in response to your request for our services. The enclosed report describes our soil engineering site evaluation and presents our professional opinions regarding geotechnical conditions at the site to be considered in the design and construction of the project.

This executive summary presents ***selected*** elements of our findings and professional opinions. This summary ***may not*** present all details needed for the proper application of our findings and professional opinions. Our findings, professional opinions, and application options are ***best related through reading the full report***, and are best evaluated with the active participation of the engineer of record who developed them. The findings of this study are summarized below:

The findings of this study indicate that the site is, in general, predominantly underlain by stiff to very stiff silty clay/clay (CL-CH) to a depth of 41.5 feet. Interbedded sandy silt/silty sand (ML/SM) and clayey silt (ML) layers of about 5 to 8 feet were encountered at a depth of 3 to 8 feet, 14 to 22 feet and 33 to 38 feet below ground surface.

The clay soils are very aggressive to concrete and steel. Concrete mixes shall have a maximum water cement ratio of 0.45 and a minimum compressive strength of 4,500 psi (minimum of 6.25 sacks Type V cement per cubic yard).

All reinforcing bars, anchor bolts and hold down bolts shall have a minimum concrete cover of 4.0 inches unless epoxy coated (ASTM D3963/A934). Hold-down straps are not allowed at the foundation perimeter. No pressurized water lines are allowed below or within the foundations.

We did not encounter soil conditions that would preclude development of the proposed project provided the professional opinions contained in this report are considered in the design and construction of this project.

We appreciate the opportunity to provide our findings and professional opinions regarding geotechnical conditions at the site. If you have any questions or comments regarding our findings, please call our office at (760) 370-3000.

Respectfully Submitted,
Landmark Consultants, Inc.

Steven K. Williams, PG, CEG
Senior Engineering Geologist

Peter E. LaBrucherie, PE, GE
Principal Geotechnical Engineer

Julian R. Avalos, GE
Senior Geotechnical Engineer

TABLE OF CONTENTS

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Appendices

APPENDIX A: Vicinity and Site Maps
APPENDIX B: Subsurface Soil Logs and Soil Key
APPENDIX C: Pipe Bedding and Trench Backfill Recommendations

Section 1
INTRODUCTION

1.1 Project Description

This report presents the findings of our geotechnical exploration and soil testing for the proposed improvements to the existing Imperial Wastewater Treatment plant located at 720 14th Street in northeast Imperial, California (See Vicinity Map, Plate A-1). The proposed improvements will consist of the removal of an existing clarifier and operations building, and the construction of an underground headworks structure which will consist of an approximate 30-foot deep concrete headworks structure.

Site development will include headworks excavations, underground utility installation including trench backfill and concrete foundation/wall construction.

1.2 Purpose and Scope of Work

The purpose of this geotechnical study was to investigate the upper 40 feet of subsurface soil at the proposed headworks site for evaluation of physical/engineering properties and liquefaction potential during seismic events. Professional opinions were developed from field and laboratory test data and are provided in this report regarding geotechnical conditions at this site and the effect on design and construction. The scope of our services consisted of the following:

- Field exploration and in-situ testing of the site soils at selected locations and depths.
- Review of the available literature and publications pertaining to local geology, faulting, and seismicity.
- Engineering analysis and evaluation of the data collected.
- Preparation of this report presenting our findings and professional opinions regarding the geotechnical aspects of project design and construction.

This report addresses the following geotechnical parameters:

- Subsurface soil and groundwater conditions
- Site geology, regional faulting and seismicity, near source factors, and site seismic accelerations
- Expansive soil and methods of mitigation
- Aggressive soil conditions to metals and concrete

Professional opinions with regard to the above parameters are provided for the following:

- Site grading and earthwork
- Foundation subgrade preparation
- Allowable soil bearing pressures and expected settlements
- Concrete slabs-on-grade
- Lateral earth pressures
- Excavation conditions and buried utility installations
- Mitigation of the potential effects of salt concentrations in native soil to concrete mixes and steel reinforcement
- Seismic design parameters

Our scope of work for this report did not include an evaluation of the site for the presence of environmentally hazardous materials or conditions, liquefaction, groundwater mounding, or landscape suitability of the soil.

1.3 Authorization

Mr. Brian Knoll of Webb Associates provided authorization by written agreement to proceed with our work on April 4, 2025. We conducted our work according to our written proposal dated April 4, 2025.

Section 2
METHODS OF INVESTIGATION

2.1 Field Exploration

Subsurface exploration was performed on April 8, 2025 using 2R Drilling of Ontario, California to advance one (1) boring to a depth of 41.5 feet below existing ground surface. A temporary piezometer pipe was placed to a depth of 20 feet below ground surface within this boring (B-1). An additional piezometer was placed north of the proposed headworks location (B-2). The borings/piezometers were advanced with a truck-mounted, CME 75 drill rig using 8-inch diameter, hollow-stem, continuous-flight augers. The approximate boring locations were established in the field and plotted on the site map by sighting to discernible site features. The boring locations are shown on the Site and Exploration Plan (Plate A-2).

A geotechnician observed the drilling operations and maintained logs of the soil encountered with sampling depths. Soils were visually classified during drilling according to the Unified Soil Classification System and relatively undisturbed and bulk samples of the subsurface materials were obtained at selected intervals. The relatively undisturbed soil samples were retrieved using a 2-inch outside diameter (OD) split-spoon sampler or a 3-inch OD Modified California Split-Barrel (ring) sampler. In addition, Standard Penetration Tests (SPT) were performed in accordance with ASTM D1586. The samples were obtained by driving the samplers ahead of the auger tip at selected depths using a 140-pound CME automatic hammer with a 30-inch drop. The number of blows required to drive the samplers the last 12 inches of an 18-inch drive depth into the soil is recorded on the boring logs as "blows per foot". Blow counts (N values) reported on the boring logs represent the field blow counts. No corrections have been applied to the blow counts shown on the boring logs for effects of overburden pressure, automatic hammer drive energy, drill rod lengths, liners, and sampler diameter. Pocket penetrometer readings were also obtained to evaluate the stiffness of cohesive soils retrieved from sampler barrels. After logging and sampling the soil, the exploratory borings were backfilled with the excavated material. The backfill was loosely placed and was not compacted to the requirements specified for engineered fill.

After excavation of the borings, a 2-inch diameter PVC piezometer was installed in each boring for groundwater level readings. The piezometers consisted of 10 feet of slotted well screen (0.010 screen size) covered with a filter sock and 10 feet of solid riser pipe. The annular space was backfilled using the native auger cuttings. The piezometers were completed with traffic rated steel manhole covers and concrete aprons.

The subsurface log is presented on Plate B-1 in Appendix B. A key to the log symbols is presented on Plate B-2. The stratification lines shown on the subsurface log represent the approximate boundaries between the various strata. However, the transition from one stratum to another may be gradual over some range of depth.

2.2 Laboratory Testing

No laboratory tests were conducted for this investigation.

Section 3
DISCUSSION

3.1 Site Conditions

The Imperial Wastewater Treatment Plant facility is rectangular in plan view and is located at 720 E. 14th Street in northeast Imperial, California. The existing west clarifier and operations building will be removed to allow construction of the proposed headworks structure.

The MBR facility (built within the last 4 years) is located to the west of the proposed headworks structure location. An oxidation basin is located adjacent to the north side of the MBR facility location plant. Existing headworks, an aeration basin and influent pump stations are located adjacent to the east side of the MBR facility area. The existing operation building, clarifiers, sludge pumping station building and the UV disinfection structure are located at the southeast side of the wastewater plant. Sludge drying beds are located to the north side of the wastewater plant. Existing underground power lines and raw water supply lines cross the wastewater plant in east to west and north to south directions.

Adjacent properties are flat-lying and are approximately at the same elevation with this site. The Imperial Public Works maintenance yard and a 2.0 MG above ground treated water steel storage tank lies to the south side of the site. P Street and the Date Canal are located along the east side of the project site with agricultural land beyond. The Union Pacific Railroad tracks are located along the west side of the project site, with the Imperial Irrigation District Headquarters Yard and IID substation beyond. The Morningside Residential subdivision lies to the north side of the wastewater plant facility.

The project site lies at an elevation of approximately 65 feet below mean sea level (MSL) (El. 935 local datum) in the Imperial Valley region of the California low desert. The surrounding properties lie on terrain which is flat (planar), part of a large agricultural valley, which was previously an ancient lakebed covered with fresh water to an elevation of 43± feet above MSL. Annual rainfall in this arid region is less than 3 inches per year with four months of average summertime temperatures above 100 °F. Winter temperatures are mild, seldom reaching freezing.

3.2 Geologic Setting

The project site is located in the Imperial Valley portion of the Salton Trough physiographic province. The Salton Trough is a topographic and geologic structural depression resulting from large scale regional faulting. The trough is bounded on the northeast by the San Andreas Fault and Chocolate Mountains and the southwest by the Peninsular Range and faults of the San Jacinto Fault Zone. The Salton Trough represents the northward extension of the Gulf of California, containing both marine and non-marine sediments deposited since the Miocene Epoch. Tectonic activity that formed the trough continues at a high rate as evidenced by deformed young sedimentary deposits and high levels of seismicity. Figure 1 shows the location of the site in relation to regional faults and physiographic features.

The Imperial Valley is directly underlain by lacustrine deposits, which consist of interbedded lenticular and tabular silt, sand, and clay. The Late Pleistocene to Holocene (present) lake deposits are probably less than 100 feet thick and derived from periodic flooding of the Colorado River which intermittently formed a freshwater lake (Lake Cahuilla). Older deposits consist of Miocene to Pleistocene non-marine and marine sediments deposited during intrusions of the Gulf of California. Basement rock consisting of Mesozoic granite and Paleozoic metamorphic rocks are estimated to exist at depths between 15,000 - 20,000 feet.

3.3 Subsurface Soil

Subsurface soils encountered during the field exploration conducted on April 8, 2025 consist of dominantly stiff to very stiff silty clay/ clay (CL-CH) to a depth of 41.5 feet. Interbedded sandy silt/silty sand (ML/SM) and clayey silt (ML) layers of about 5 to 8 feet were encountered at a depth of 3 to 8 feet, 14 to 22 feet and 33 to 38 feet below ground surface.

The native surface clays likely exhibit moderate to high swell potential (Expansion Index, EI = 51 to 110) when correlated to Plasticity Index tests (ASTM D4318) performed on the native clays. The clay is expansive when wetted and can shrink with moisture loss (drying).

3.4 Groundwater

Groundwater was encountered in the borings at about 13 feet during the time of exploration but stabilized within the installed piezometers at approximately 9 feet below ground surface at Boring B-1 and 10 feet below ground surface at Boring B-2 on April 9, 2025, approximately 24 hours after installation. Dewatering should be anticipated for wet well construction and piping installed below a depth of 9 feet. There is uncertainty in the accuracy of short-term water level measurements, particularly in fine-grained soil. Groundwater levels may fluctuate with precipitation, irrigation of adjacent properties, drainage, and site grading. The referenced groundwater level should not be interpreted to represent an accurate or permanent condition. Our work scope did not include a groundwater surface mounding study resulting from applied landscape water.

3.5 Faulting

The project site is located in the seismically active Imperial Valley of southern California with numerous mapped faults of the San Andreas Fault System traversing the region. The San Andreas Fault System is comprised of the San Andreas, San Jacinto, and Elsinore Fault Zones in southern California. The Imperial fault represents a transition from the more continuous San Andreas fault to a more nearly echelon pattern characteristic of the faults under the Gulf of California (USGS 1990). We have performed a computer-aided search of known faults or seismic zones that lie within a 36-mile radius of the project site (Table 1).

A fault map illustrating known active faults relative to the site is presented on Figure 1, *Regional Fault Map*. Figure 2 shows the project site in relation to local faults. The criterion for fault classification adopted by the California Geological Survey defines Earthquake Fault Zones along active or potentially active faults. An active fault is one that has ruptured during Holocene time (roughly within the last 11,000 years). A fault that has ruptured during the last 1.8 million years (Quaternary time), but has not been proven by direct evidence to have not moved within Holocene time is considered to be potentially active. A fault that has not moved during Quaternary time is considered to be inactive. Review of the current Alquist-Priolo Earthquake Fault Zone maps (CGS, 2000a) indicates that the nearest mapped Earthquake Fault Zone is the Imperial fault located approximately 2.4 miles northeast of the project site.

3.6 General Ground Motion Analysis

The project site is considered likely to be subjected to moderate to strong ground motion from earthquakes in the region. Ground motions are dependent primarily on the earthquake magnitude and distance to the seismogenic (rupture) zone. Acceleration magnitudes also are dependent upon attenuation by rock and soil deposits, direction of rupture and type of fault; therefore, ground motions may vary considerably in the same general area.

2022 CBC General Ground Motion Parameters: The California Building Code (CBC) requires that a site-specific ground motion hazard analysis be performed in accordance with ASCE 7-16 Section 11.4.8 (ASCE, 2016) for structures on Site Class D with S_1 greater than or equal to 0.2 and Site Class E sites with S_S greater than or equal to 1.0 (CBC, 2023). **This project site has been classified as Site Class D and has a S_1 value of 0.65, which would require a site-specific ground motion hazard analysis**. However, ASCE 7-16 Section 11.4.8 Supplement 3 provides exceptions which permit the use of conservative values of design parameters for certain conditions for Site Class D and E sites in lieu of a site specific hazard analysis. The exceptions are:

- Site Class D sites: A ground motion hazard analysis is not required where the value of the parameter S_{M1} determined by Equation 11.4-2 is increased by 50% for all applications of S_{M1} in ASCE 7-16. The resulting value of the parameter S_{D1} determined by ASCE 7-16 Equation 11.4-4 shall be used for all applications of S_{D1} in ASCE 7-16.

- Site Class E sites: A ground motion hazard analysis is not required:
  a. Where the equivalent lateral force procedure is used for design and the value of C_S is determined by ASCE 7-16 Equation 12.8-2 for all values of T, or
  b. Where (i) the value of S_{a1} is determined by ASCE 7-16 Equation 15.7-7 for all values of T_1 and (ii) the value of the parameter S_{D1} is replaced with $1.5S_{D1}$ in ASCE 7-16 Equation 15.7-10 and ASCE 7-16 Equation 15.7-11.

Based on the project site being classified as Site Class D, the structural engineer should increase the parameter S_{M1} provided in Table 2 by 50% for all applications of S_{M1} in ASCE 7-16. If a site-specific ground motion hazard analysis is required for the project, our office should be consulted to perform a site-specific ground motion hazard analysis. **Design earthquake ground motion parameters are provided in Table 2.**

The 2022 CBC general ground motion parameters are based on the Risk-Targeted Maximum Considered Earthquake (MCE_R). The Structural Engineers Association of California (SEAOC) and Office of Statewide Health Planning and Development (OSHPD) Seismic Design Maps Web Application (SEAOC, 2025) was used to obtain the site coefficients and adjusted maximum considered earthquake spectral response acceleration parameters. Design spectral response acceleration parameters are defined as the earthquake ground motions that are two-thirds (2/3) of the corresponding MCE_R ground motions. The Maximum Considered Earthquake Geometric Mean (MCE_G) peak ground acceleration adjusted for soil site class effects (PGA_M) value to be used for liquefaction and seismic settlement analysis in accordance with 2022 CBC Section 1803.5.12.2 is estimated at 0.84g for the project site.

3.7 Seismic and Other Hazards

- **Groundshaking.** The primary seismic hazard at the project site is the potential for strong groundshaking during earthquakes along the Imperial, Brawley, and Superstition Hills faults.
- **Surface Rupture.** The California Geological Survey has established Earthquake Fault Zones in accordance with the 1972 Alquist-Priolo Earthquake Fault Zone Act. The Earthquake Fault Zones consists of boundary zones surrounding well defined, active faults or fault segments. The project site does not lie within an A-P Earthquake Fault Zone; therefore, surface fault rupture is considered to be low at the project site.
- **Liquefaction.** Liquefaction is a potential design consideration because of underlying saturated sandy substrata. Although the Imperial Valley has not yet been evaluated for seismic hazards by the California Geological Survey seismic hazards zonation program, liquefaction is well documented in the Imperial Valley after strong seismic events (McCrink, et al, 2011 and Rymer et al, 2011). ***The evaluation for the potential for liquefaction induced settlements at the site is not included in the scope of work for this project.***

Other Potential Geologic Hazards.

- **Landsliding.** The hazard of landsliding is unlikely due to the regional planar topography. No ancient landslides are shown on geologic maps of the region and no indications of landslides were observed during our site investigation.
- **Volcanic hazards.** The site is not located in proximity to any known volcanically active area and the risk of volcanic hazards is considered very low.

- **Tsunamis and seiches.** The site is not located near any large bodies of water, so the threat of tsunami, seiches, or other seismically-induced flooding is unlikely.
- **Flooding.** The project site is located in FEMA Flood Zone X, an area determined to be outside the 0.2% annual chance floodplain (FIRM Panel 06025C1725C).
- **Expansive soil.** In general, much of the near surface soils in the Imperial Valley consist of silty clays and clays which are moderate to highly expansive. The expansive soil conditions are discussed in more detail in Section 3.3.

Section 4
DESIGN CRITERIA

4.1 Site Preparation

Clearing and Grubbing: All surface improvements, debris or vegetation including grass and weeds on the site at the time of construction should be removed from the construction area. Root balls should be completely excavated. Organic strippings should be stockpiled and not used as engineered fill. All trash, construction debris, concrete slabs, old pavement, landfill, and buried obstructions such as old foundations and utility lines exposed during rough grading should be traced to the limits of the foreign material by the grading contractor and removed under our supervision. Any excavations resulting from site clearing should be sloped to a bowl shape to the lowest depth of disturbance and backfilled under the observation of the geotechnical engineer's representative.

Below Grade Structures Site Preparation: The headworks structure is planned to be constructed at the location of the existing operations building and is anticipated to be founded at approximately 30 feet below existing grade. The subsurface silty clays at the proposed bottom of excavation are saturated; consequently, the subgrade has a high potential for pumping under equipment loads. Therefore, the subgrade for the new headworks structure should be overexcavated 24 inches and replaced with drainage rock (ASTM C33, Size 57 or 467). The bottom of the excavation should be covered with a geotextile filter fabric (Mirafi 180 or better) lapped at sides and ends in accordance with manufacture's installations guidelines. The 2.0 ft thick layer of drainage rock should be end-dumped onto the filter fabric and spread evenly by excavators or dozers. Upon completing placement of the drainage rock a small vibratory compactor (walk-behind or equivalent) should be used to densify the crushed rock layer. Following densification of the drainage rock, a second layer of filter fabric should be placed over the drainage rock.

Excavation for the headworks structure (approximately 30 feet depth) will encounter the groundwater table (9 feet bgs). Therefore, seepage and pumping subgrade conditions should be anticipated. An adequately designed dewatering system, such as well points or sumps, will be required to control groundwater seepage and prevent running ground conditions. During construction groundwater should be maintained a minimum of 2 feet below the bottom of the excavation. The responsibility for dewatering and selection of an appropriate system for dewatering is beyond the scope of this report.

Utility Trench Backfill: Prior to placement of utility bedding, the exposed subgrade at the bottom of trench excavations should be examined for soft, loose, or unstable soil. Loose materials at trench bottoms resulting from excavation disturbance should be removed to firm material. If extensive soft or unstable areas are encountered, these areas should be over-excavated to a depth of at least 2 feet or to a firm base and be replaced with additional bedding material.

Backfill Materials: Pipe zone backfill (i.e., material beneath and in the immediate vicinity of the pipe) should consist of a 4 to 8 inch bed of ⅜-inch crushed rock, sand/cement slurry (3 sack cement factor), and/or crusher fines (sand) extending to a minimum of 12 inches above the top of pipe. If crushed rock is used for pipe zone backfill for utilities, the crushed rock material should be completed surrounded by a non-woven filter fabric such as Mirafi 140N or equivalent. The filter fabric shall cover the trench bottom, sidewalls and over the top of the crushed rock. The filter fabric is recommended to inhibit the migration of fine material into void spaces in the crushed rock which may create the potential for sinkholes or depressions to develop at the ground surface.

Pipe bedding should be in accordance with pipe manufacturer's recommendations. Recommendations provided above for pipe zone backfill are minimum requirements only. More stringent material specifications may be required to fulfill local codes and/or bedding requirements for specific types of pipes. On-site soil free of debris, vegetation, and other deleterious matter may be suitable for use as utility trench backfill above pipezone but may be difficult to uniformly maintain at specified moistures and compact to the specified densities. Native backfill should only be placed and compacted after encapsulating buried pipes with suitable bedding and pipe envelope material.

Compaction Criteria: Mechanical compaction is recommended; ponding or jetting should not be allowed, especially in areas supporting structural loads or beneath concrete slabs supported-on-grade, pavements, or other improvements. All trench backfill should be placed and compacted in accordance with recommendations provided above for engineered fill.

The pipe zone material (crusher fines, sand) shall be compacted to a minimum of 95% of ASTM D1557 maximum density. Pipe deflection should be checked to not exceed 2% of pipe diameter. Native clay/silt soils may be used to backfill the remainder of the trench. Soils used for trench backfill shall be placed in maximum 6-inch lifts (loose), compacted to a minimum of 90% of ASTM D1557 maximum density at a minimum of 4% above optimum moisture.

Imported granular material is acceptable for backfill of utility trenches. Granular trench backfill used in building pad areas should be plugged with a solid (no clods or voids) 2-foot width of native clay soils at each end of the building foundation to prevent landscape water migration into the trench below the building.

Backfill soil of utility trenches within paved areas should be uniformly moisture conditioned to a minimum of 4% above optimum moisture, placed in layers not more than 6 inches in thickness and mechanically compacted to a minimum of 90% of the ASTM D1557 maximum dry density, except that the top 12 inches shall be compacted to 95% (if granular trench backfill).

Observation and Density Testing: All site preparation and fill placement should be continuously observed and tested by a representative of a qualified geotechnical engineering firm. Full-time observation services during the excavation and scarification process is necessary to detect undesirable materials or conditions and soft areas that may be encountered in the construction area. The geotechnical firm that provides observation and testing during construction shall assume the responsibility of "*geotechnical engineer of record*" and, as such, shall perform additional tests and investigation as necessary to satisfy themselves as to the site conditions and the geotechnical parameters for site development.

Auxiliary Structures Foundation Preparation: Auxiliary structures such as free standing or retaining walls should have footings extended to a minimum of 30 inches below grade. The existing soil beneath the structure foundation preparation needed only to extend 18 inches below and beyond the footing.

4.2 Foundations and Settlements

Structural concrete mat foundations are suitable to support the headworks structure. The mats shall be founded on a layer of properly prepared and compacted soil as described in Section 4.1.

The relatively light headworks structure may use soil unloading as a means to control settlement. The general, in-situ soil load is approximately 120 pcf and by removing 30 feet of soil, 3,600 psf of foundation loading can be offset (e.g. a 5,000 psf foundation load can be reduced to 1,400 psf net soil loading).

The foundations may be designed using an allowable net soil bearing pressure of 3,000 psf when foundations are supported a minimum 20 feet below ground surface.

Flat Plate Structural Mats: Flat plate structural mats may be used to mitigate expansive soils at the project site. The structural mat shall have a double mat of steel (minimum No. 4's @ 12 inches O.C. each way – top and bottom) and a minimum thickness of 10 inches. Mat edges shall have a minimum edge footing of 12 inches width and 24 inches depth (below the building pad surface).

Structural mats may be designed for a modulus of subgrade reaction (Ks) of 50 pci when placed on compacted native soil or a subgrade modulus of 250 pci when placed on 24 inches of crushed rock (below grade structures).

Resistance to horizontal loads will be developed by passive earth pressure on the sides of footings and frictional resistance developed along the bases of footings and concrete slabs. Passive resistance to lateral earth pressure may be calculated using an equivalent fluid pressure of 250 pcf (300 pcf for imported sands or crushed rock) to resist lateral loadings. The top one foot of embedment should not be considered in computing passive resistance unless the adjacent area is confined by a slab or pavement. An allowable friction coefficient of 0.25 (0.35 for imported sands or crushed rock) may also be used at the base of the footings to resist lateral loading.

Foundation movement under the estimated static (non-seismic) loadings and static site conditions are estimated to not exceed 1 inch with differential movement of about two-thirds of total movement for the loading assumptions stated above when the subgrade preparation guidelines given above are followed.

4.3 Slabs-On-Grade

Structural Concrete: Structural concrete slabs are those slabs (foundations) that underlie structures or patio covers (shades). These slabs that are placed over native clay soil should be either a uniformly thick structural mats (10 inches or greater) or should be designed in accordance with Chapter 18 of the 2022 CBC and shall be a minimum of 5 inches thick due to expansive soil conditions. Concrete floor slabs shall be monolithically placed with the footings (no cold joints) unless placed on 3.0 feet of granular fill soil.

American Concrete Institute (ACI) guidelines (ACI 302.1R-15 Chapter 5, Section 5.2.3) provide recommendations regarding the use of moisture barriers beneath concrete slabs. The concrete floor slabs should be underlain by a 10-mil polyethylene vapor retarder that works as a capillary break to reduce moisture migration into the slab section. All laps and seams should be overlapped 6-inches or as recommended by the manufacturer. The vapor retarder should be protected from puncture. The joints and penetrations should be sealed with the manufacturer's recommended adhesive, pressure-sensitive tape, or both. The vapor retarder should extend a minimum of 12 inches into the footing excavations. The vapor retarder should be covered by 4 inches of clean sand (Sand Equivalent SE>30) unless placed on 3.5 feet of granular fill, in which case, the vapor retarder may lie directly on the granular fill with 2 inches of clean sand cover.

Placing sand over the vapor retarder may increase moisture transmission through the slab, because it provides a reservoir for bleed water from the concrete to collect. The sand placed over the vapor retarder may also move and mound prior to concrete placement, resulting in an irregular slab thickness. For areas with moisture sensitive flooring materials, ACI recommends that concrete slabs be placed without a sand cover directly over the vapor retarder, provided that the concrete mix uses a low-water cement ratio and concrete curing methods are employed to compensate for release of bleed water through the top of the slab. The vapor retarder should have a minimum thickness of 15-mil (Stego-Wrap or equivalent).

Structural concrete slab reinforcement should consist of chaired rebar slab reinforcement (minimum of No. 4 bars at 18-inch centers, both horizontal directions) placed at slab mid-height to resist potential swell forces and cracking. Slab thickness and steel reinforcement are minimums only and should be verified by the structural engineer/designer knowing the actual project loadings. All steel components of the foundation system should be protected from corrosion by maintaining a 4-inch minimum concrete cover of densely consolidated concrete at footings (by use of a vibrator). The construction joint between the foundation and any mowstrips/sidewalks placed adjacent to foundations should be sealed with a polyurethane based non-hardening sealant to prevent moisture migration between the joint. Epoxy coated embedded steel components (ASTM D3963/A934) or permanent waterproofing membranes placed at the exterior footing sidewall may also be used to mitigate the corrosion potential of concrete placed in contact with native soil.

Control joints should be provided in all concrete slabs-on-grade at a maximum spacing (in feet) of 2 to 3 times the slab thickness (in inches) as recommended by American Concrete Institute (ACI) guidelines. All joints should form approximately square patterns to reduce randomly oriented contraction cracks. Contraction joints in the slabs should be tooled at the time of the pour or sawcut (¼ of slab depth) within 6 to 8 hours of concrete placement. Construction (cold) joints in foundations and area flatwork should either be thickened butt-joints with dowels or a thickened keyed-joint designed to resist vertical deflection at the joint. All joints in flatwork should be sealed to prevent moisture, vermin, or foreign material intrusion. Precautions should be taken to prevent curling of slabs in this arid desert region (refer to ACI guidelines).

Non-structural Concrete: All non-structural independent flatwork (sidewalks and housekeeping slabs) shall be a minimum of 4 inches thick and should be placed on a minimum of 4 inches of compacted (90%) concrete sand or aggregate base, dowelled to the perimeter foundations where adjacent to the building to prevent separation and sloped 2% (sidewalks) or 1 to 2% (housekeeping slabs) away from the building. A 15-mil polypropylene vapor barrier shall be placed over native soils prior to placing sand underlayment. Area slabs with shade structures shall have an 18-inch deep perimeter footing and shall have interior grade beams at 15 feet on center. Planters that trap water between sidewalks and foundations are not allowed.

A minimum of 24 inches of moisture conditioned (5% minimum above optimum) and 8 inches of compacted subgrade (85 to 90%) should underlie all independent flatwork. Flatwork which contains steel reinforcing (except wire mesh) should be underlain by a 10-mil (minimum) polyethylene separation sheet and at least a 2-inch sand cover. All flatwork should be jointed in square patterns and at irregularities in shape at a maximum spacing of 8 feet or the least width of the sidewalk.

4.4 Concrete Mixes and Corrosivity

Past projects at the project site have indicated severe levels of sulfate ion concentration (approximately 4,000 ppm). Sulfate ions in high concentrations can attack the cementitious material in concrete, causing weakening of the cement matrix and eventual deterioration by raveling. The following table provides American Concrete Institute (ACI) recommended cement types, water-cement ratio and minimum compressive strengths for concrete in contact with soils:

Concrete Mix Design Criteria due to Soluble Sulfate Exposure

Sulfate Exposure	Water-soluble Sulfate (SO_4) in soil, ppm	Cement Type	Maximum Water-Cement Ratio by weight	Minimum Strength f'c (psi)
Negligible	0-1,000	–	–	–
Moderate	1,000-2,000	II	0.50	4,000
Severe	2,000-20,000	V	0.45	4,500
Very Severe	Over 20,000	V (plus Pozzolon)	0.45	4,500

Note: from ACI 318-11 Table 4.2.1

A minimum of 6.25 sacks per cubic yard of concrete (4,500 psi) of Type V Portland Cement with a maximum water/cement ratio of 0.45 (by weight) should be used for concrete placed in contact with native soil on this project (sitework including hardscape and foundations). Admixtures may be required to allow placement of this low water/cement ratio concrete. Thorough concrete consolidation and hard trowel finishes should be used due to the aggressive soil exposure.

The native soil (past projects) has very severe levels of chloride ion concentration (5,000 to 10,000 ppm). Chloride ions can cause corrosion of reinforcing steel, anchor bolts and other buried metallic conduits. Resistivity determinations on the soil indicate very severe potential for metal loss because of electrochemical corrosion processes.

Mitigation of the corrosion of steel can be achieved by using steel pipes coated with epoxy corrosion inhibitors, asphaltic and epoxy coatings, cathodic protection or by encapsulating the portion of the pipe lying above groundwater with a minimum of 4 inches of densely consolidated concrete. ***No metallic water pipes or conduits should be placed below foundations.***

Foundation designs shall provide a minimum concrete cover of four (4) inches around steel reinforcing or embedded components (anchor bolts, etc.) exposed to native soil or landscape water (to 18 inches above grade). If the 4-inch concrete edge distance cannot be achieved, all embedded steel components (anchor bolts, etc.) shall be epoxy coated for corrosion protection (in accordance with ASTM D3963/A934) or a corrosion inhibitor and a permanent waterproofing membrane shall be placed along the exterior face of the exterior footings. ***Hold-down straps should not be used at foundation edges due to corrosion of metal at its protrusion from the slab edge.*** Additionally, the concrete should be thoroughly vibrated at footings during placement to decrease the permeability of the concrete. ***Copper water piping should not be placed under floor slabs.***

4.5 Excavations

All site excavations should conform to CalOSHA requirements for Type B soil (if site is dewatered or Type C soils for non-dewatered excavations). The contractor is solely responsible for the safety of workers entering trenches. Temporary excavations with depths of 4 feet or less may be cut nearly vertical for short duration. Excavations deeper than 4 feet will require shoring or slope inclinations in conformance to CAL/OSHA regulations for Type B soil. These temporary deep excavations will require slope inclinations no steeper than 1½(H):1(V) unless trench shoring is used. If excavations are planned below groundwater (10 feet below ground surface), all excavation slopes should be excavated according to OSHA Standards for Type C soils. Dewatering of the excavation site will be required prior to start of excavation (2 ft. below bottom of excavation).

All permanent slopes should not be steeper than 3:1 to reduce wind and rain erosion. Protected slopes with ground cover may be as steep as 2:1. However, maintenance with motorized equipment may not be possible at this inclination.

All discussions in this section regarding stable excavation slopes assume minimal equipment vibration and adequate setback of excavated material and construction equipment from the top of the excavation. We recommended that the minimum setback distance be equal to the depth of excavation and at least 10 feet from the crown of the slope. If excavated materials are stockpiled adjacent to the excavation, the weight of the material should be considered as a surcharge load for slope stability.

Excavation for the headworks (approximately 30 feet depth) will encounter the groundwater table (9 feet bgs). Therefore, seepage and pumping subgrade conditions should be anticipated. An adequately designed dewatering system, such as well points or sumps, will be required to control groundwater seepage and prevent running ground conditions. The responsibility for dewatering and selection of an appropriate system for dewatering is beyond the scope of this report.

4.6 Lateral Earth Pressures

Earth retaining structures, such as retaining walls, should be designed to resist the soil pressure imposed by the retained soil mass. Walls with granular drained backfill may be designed for an assumed static earth pressure equivalent to that exerted by a fluid weighing 60 pcf (native) and 45 pcf (granular) for unrestrained (active) conditions (able to rotate 0.1% of wall height), and 100 (native) and 60 pcf (granular) for restrained (at-rest) conditions. These values should be verified at the actual wall locations during construction.

Walls below groundwater may be designed with a static earth pressure equivalent to that exerted by a fluid weighing 35 pcf (native) and 25 pcf (granular) for unrestrained (active) conditions, and 60 (native) and 35 pcf (granular) for restrained (at-rest) conditions. Hydrostatic water pressure of 62.4 pcf shall be added to the provided values for structures below groundwater. Native soils unit weight considered are as follows:

bulk unit weight = 125 pcf
saturated unit weight = 133 pcf
submerged unit weight = 71 pcf.

When applicable (Seismic Design Category D, E or F), retaining wall structures where the backfill is greater than 6 feet high shall be designed in addition to the static loading (active or at-rest condition) with an additional seismic lateral pressure increasing linearly with depth and the resultant acting as a point load at 0.4H above the base of the wall. The term H is the height of the backfill against a retaining wall in feet. The seismic load increment, shall be determined using the following equations for different wall type and backfill conditions:

Basement (restrained) walls with level backfill: $\Delta K_{ae} = \frac{1}{2}\gamma H^2(0.68\ PGA_M/g)$

Cantilever (unrestrained) wall with level backfill: $\Delta K_{ae} = \frac{1}{2}\gamma H^2(0.42\ PGA_M/g)$

Cantilever (unrestrained) wall with sloping backfill*: $\Delta K_{ae} = \frac{1}{2}\gamma H^2(0.70\ PGA_M/g)$

*Applicable for sloping backfill that is no steeper than 2:1 (horizontal:vertical).

Where:

ΔK_{ae} = Seismic Lateral Force (plf) based on seismic pressure
γ = 125 pcf
H = Height of retained soil (ft)
g = A PGA_M value of 0.84g has been determined for the project site.

Surcharge loads should be considered if loads are applied within a zone between the face of the wall and a plane projected behind the wall 45 degrees upward from the base of the wall. The increase in lateral earth pressure acting uniformly against the back of the wall should be taken as 50% of the surcharge load within this zone. Areas of the retaining wall subjected to traffic loads should be designed for a uniform surcharge load equivalent to two feet of native soil.

Walls should be provided with backdrains to reduce the potential for the buildup of hydrostatic pressure. The drainage system should consist of a composite HDPE drainage panel, or a 2-foot-wide zone of free draining crushed rock placed adjacent to the wall and extending 2/3 the height of the wall. The gravel should be completely enclosed in an approved filter fabric to separate the gravel and backfill soil. A perforated pipe should be placed perforations down at the base of the permeable material at least six inches below finished floor elevations. The pipe should be sloped to drain to an appropriate outlet that is protected against erosion. Walls should be properly waterproofed. The project geotechnical engineer should approve any alternative drain system.

4.7 Seismic Design

This site is located in the seismically active southern California area and the site structures are subject to strong ground shaking due to potential fault movements along the Brawley, Superstition Hills, and Imperial Faults. Engineered design and earthquake-resistant construction are the common solutions to increase safety and development of seismic areas. Designs should comply with the latest edition of the CBC for Site Class D using the seismic coefficients given in Section 3.6 and Table 2 of this report.

Section 5
LIMITATIONS AND ADDITIONAL SERVICES

5.1 Limitations

The findings and professional opinions within this report are based on current information regarding the proposed improvements to the existing Imperial Wastewater Treatment plant located at 720 E. 14th Street in northeast Imperial, California.

The conclusions and professional opinions of this report are invalid if:

- Structural loads change from those stated or the structures are relocated.
- The Additional Services section of this report is not followed.
- This report is used for adjacent or other property.
- Changes of grade or groundwater occur between the issuance of this report and construction other than those anticipated in this report.
- Any other change that materially alters the project from that proposed at the time this report was prepared.

Findings and professional opinions in this report are based on selected points of field exploration, geologic literature, laboratory testing, and our understanding of the proposed project. Our analysis of data and professional opinions presented herein are based on the assumption that soil conditions do not vary significantly from those found at specific exploratory locations. Variations in soil conditions can exist between and beyond the exploration points or groundwater elevations may change. If detected, these conditions may require additional studies, consultation, and possible design revisions.

This report contains information that may be useful in the preparation of contract specifications. However, the report is not worded is such a manner that we recommend its use as a construction specification document without proper modification. The use of information contained in this report for bidding purposes should be done at the contractor's option and risk.

This report was prepared according to the generally accepted *geotechnical engineering standards of practice* that existed in Imperial County at the time the report was prepared. No express or implied warranties are made in connection with our services. This report should be considered invalid for periods after two years from the report date without a review of the validity of the findings and professional opinions by our firm, because of potential changes in the Geotechnical Engineering Standards of Practice.

The client has responsibility to see that all parties to the project including, designer, contractor, and subcontractor are made aware of this entire report. The use of information contained in this report for bidding purposes should be done at the contractor's option and risk.

5.2 Additional Services

We recommend that a qualified geotechnical consultant be retained to provide the tests and observations services during construction. *The geotechnical engineering firm providing such tests and observations shall become the geotechnical engineer of record and assume responsibility for the project.*

The professional opinions presented in this report are based on the assumption that:

- Consultation during development of design and construction documents to check that the geotechnical professional opinions are appropriate for the proposed project and that the geotechnical professional opinions are properly interpreted and incorporated into the documents.
- Landmark Consultants will have the opportunity to review and comment on the plans and specifications for the project prior to the issuance of such for bidding.
- Observation, inspection, and testing by the geotechnical consultant of record during site clearing, grading, excavation, placement of fills, building pad and subgrade preparation, and backfilling of utility trenches.
- Observation of foundation excavations and reinforcing steel before concrete placement.
- Other consultation as necessary during design and construction.

We emphasize our review of the project plans and specifications to check for compatibility with our professional opinions and conclusions. Additional information concerning the scope and cost of these services can be obtained from our office.

Section 6
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TABLES

Table 1
Summary of Characteristics of Closest Known Active Faults

Fault Name	Approximate Distance (miles)	Approximate Distance (km)	Maximum Moment Magnitude (Mw)	Fault Length (km)	Slip Rate (mm/yr)
Imperial	2.4	3.8	7	62 ± 6	20 ± 5
Superstition Hills	3.2	5.1	6.6	23 ± 2	4 ± 2
Brawley *	5.0	8.1			
Superstition Mountain	7.5	12.1	6.6	24 ± 2	5 ± 3
Rico *	9.8	15.7			
Route 247*	13.4	21.5			
Northern Centinela*	13.7	21.9			
Yuha*	15.4	24.7			
Shell Beds	17.1	27.3			
Yuha Well *	17.2	27.4			
Painted Gorge Wash*	20.0	32.1			
Vista de Anza*	20.3	32.6			
Laguna Salada	20.4	32.6	7	67 ± 7	3.5 ± 1.5
Elmore Ranch	20.5	32.8	6.6	29 ± 3	1 ± 0.5
Borrego (Mexico)*	21.3	34.1			
Ocotillo*	24.4	39.0			
Cerro Prieto *	24.9	39.8			
Pescadores (Mexico)*	26.8	42.9			
San Jacinto - Borrego	27.2	43.6	6.6	29 ± 3	4 ± 2
Elsinore - Coyote Mountain	27.6	44.1	6.8	39 ± 4	4 ± 2
Cucapah (Mexico)*	28.1	45.0			
San Andreas - Coachella	35.6	56.9	7.2	96 ± 10	25 ± 5

* Note: Faults not included in CGS database.

Table 2
2022 California Building Code (CBC) and ASCE 7-16 Seismic Parameters

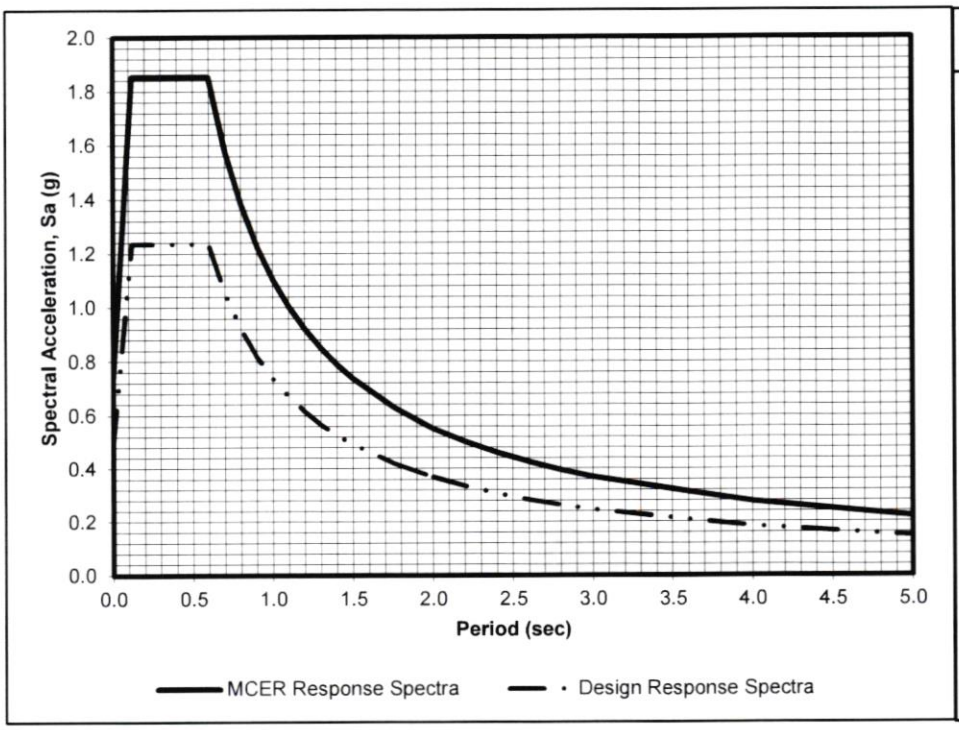
			ASCE 7-16 Reference
Soil Site Class:	**D**		Table 20.3-1
Latitude:	32.8538	N	
Longitude:	-115.5624	W	
Risk Category:	II		
Seismic Design Category:	D		

Maximum Considered Earthquake (MCE) Ground Motion

Mapped MCE_R Short Period Spectral Response	S_s	1.854 g	ASCE Figure 22-1	
Mapped MCE_R 1 second Spectral Response	S_1	0.650 g	ASCE Figure 22-2	
Short Period (0.2 s) Site Coefficient	F_a	1.00	ASCE Table 11.4-1	
Long Period (1.0 s) Site Coefficient	F_v	1.70	ASCE Table 11.4-2	
MCE_R Spectral Response Acceleration Parameter (0.2 s)	S_{MS}	1.854 g	= Fa * S_s	ASCE Equation 11.4-1
MCE_R Spectral Response Acceleration Parameter (1.0 s)	S_{M1}	1.105 g	= Fv * S_1	ASCE Equation 11.4-2

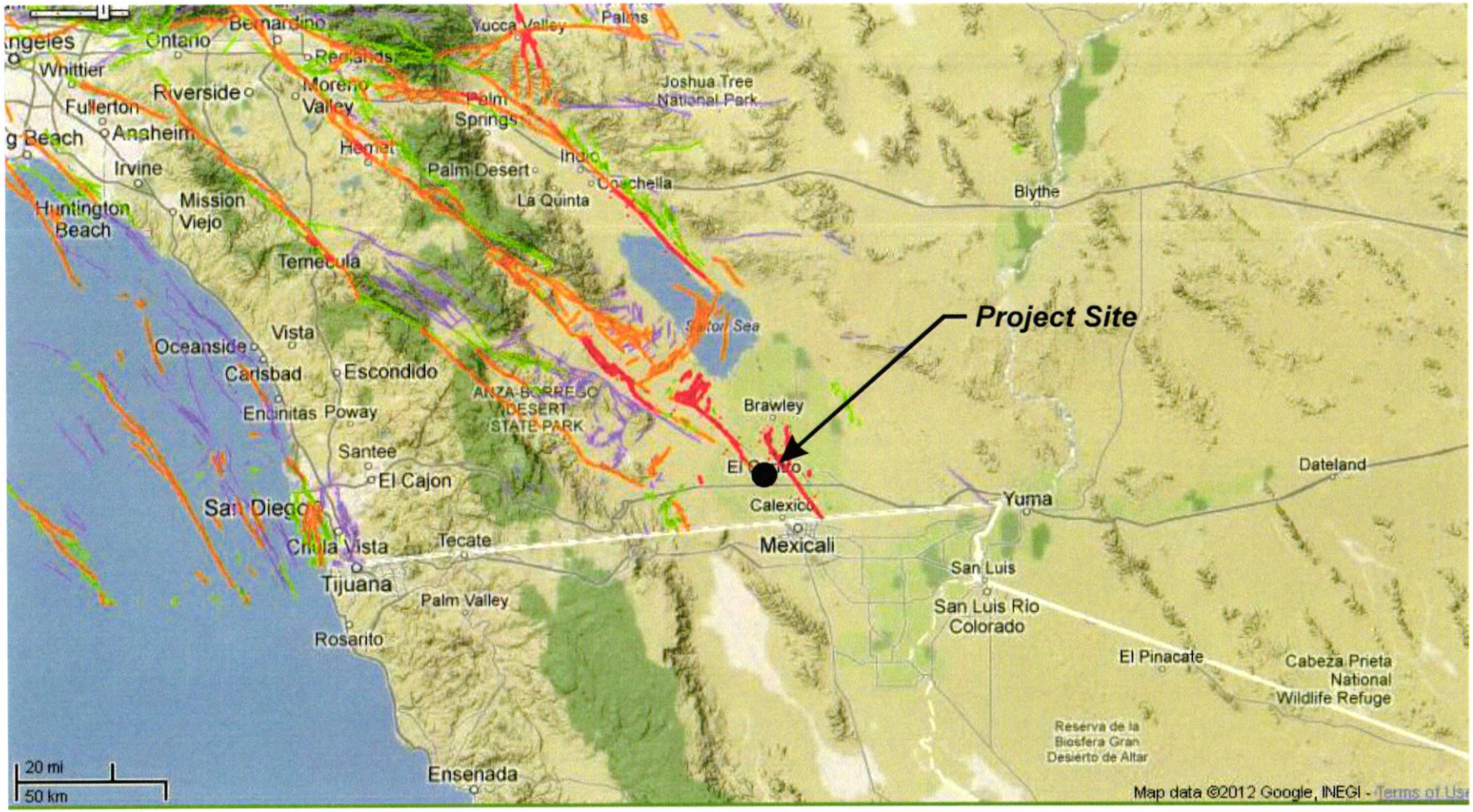
Design Earthquake Ground Motion

Design Spectral Response Acceleration Parameter (0.2 s)	S_{DS}	1.236 g	= 2/3*S_{MS}	ASCE Equation 11.4-3
Design Spectral Response Acceleration Parameter (1.0 s)	S_{D1}	0.737 g	= 2/3*S_{M1}	ASCE Equation 11.4-4
Risk Coefficient at Short Periods (less than 0.2 s)	C_{RS}	0.955		ASCE Figure 22-17
Risk Coefficient at Long Periods (greater than 1.0 s)	C_{R1}	0.924		ASCE Figure 22-18
	T_L	8.00 sec		ASCE Figure 22-12
	T_O	0.12 sec	=0.2*S_{D1}/S_{DS}	
	T_S	0.60 sec	=S_{D1}/S_{DS}	
Peak Ground Acceleration	PGA_M	0.84 g		ASCE Equation 11.8-1



Period T (sec)	Sa (g)	MCE_R Sa (g)
0.00	0.49	0.74
0.12	1.24	1.85
0.60	1.24	1.85
0.70	1.05	1.58
0.80	0.92	1.38
0.90	0.82	1.23
1.00	0.74	1.11
1.10	0.67	1.00
1.20	0.61	0.92
1.30	0.57	0.85
1.40	0.53	0.79
1.50	0.49	0.74
1.75	0.42	0.63
2.00	0.37	0.55
2.20	0.33	0.50
2.40	0.31	0.46
2.60	0.28	0.43
2.80	0.26	0.39
3.00	0.25	0.37
4.00	0.18	0.28
5.00	0.15	0.22

FIGURES



Source: California Geological Survey 2010 Fault Activity Map of California
http://www.quake.ca.gov/gmaps/FAM/faultactivitymap.html#

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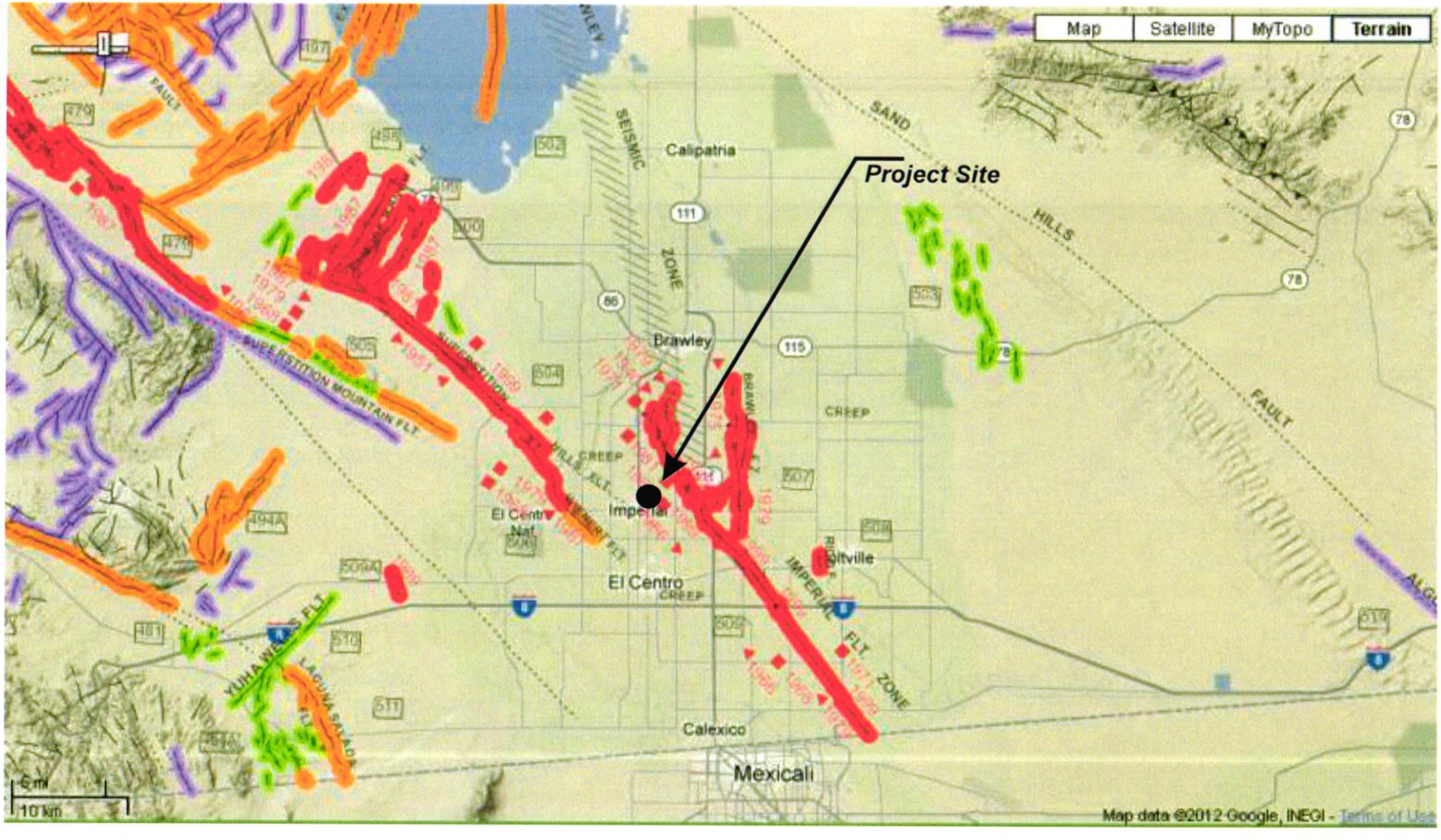
Regional Fault Map

Figure 1



Source: California Geological Survey 2010 Fault Activity Map of California
http://www.quake.ca.gov/gmaps/FAM/faultactivitymap.html#

LANDMARK Geo-Engineers and Geologists Project No.: LE25072	Map of Local Faults	Figure 2

EXPLANATION

Fault traces on land are indicated by solid lines where well located, by dashed lines where approximately located or inferred, and by dotted lines where concealed by younger rocks or by lakes or bays. Fault traces are queried where continuation or existence is uncertain. Concealed faults in the Great Valley are based on maps of selected subsurface horizons, so locations shown are approximate and may indicate structural trend only. All offshore faults based on seismic reflection profile records are shown as solid lines where well defined, dashed where inferred, queried where uncertain.

FAULT CLASSIFICATION COLOR CODE
(Indicating Recency of Movement)

Fault along which historic (last 200 years) displacement has occurred and is associated with one or more of the following:

(a) a recorded earthquake with surface rupture. (Also included are some well-defined surface breaks caused by ground shaking during earthquakes, e.g. extensive ground breakage, not on the White Wolf fault, caused by the Arvin-Tehachapi earthquake of 1952). The date of the associated earthquake is indicated. Where repeated surface ruptures on the same fault have occurred, only the date of the latest movement may be indicated, especially if earlier reports are not well documented as to location of ground breaks.

(b) fault creep slippage - slow ground displacement usually without accompanying earthquakes.

(c) displaced survey lines.

A triangle to the right or left of the date indicates termination point of observed surface displacement. Solid red triangle indicates known location of rupture termination point. Open black triangle indicates uncertain or estimated location of rupture termination point.

Date bracketed by triangles indicates local fault break.

No triangle by date indicates an intermediate point along fault break.

Fault that exhibits fault creep slippage. Hachures indicate linear extent of fault creep. Annotation (creep with leader) indicates representative locations where fault creep has been observed and recorded.

Square on fault indicates where fault creep slippage has occured that has been triggered by an earthquake on some other fault. Date of causative earthquake indicated. Squares to right and left of date indicate terminal points between which triggered creep slippage has occurred (creep either continuous or intermittent between these end points).

Holocene fault displacement (during past 11,700 years) without historic record. Geomorphic evidence for Holocene faulting includes sag ponds, scarps showing little erosion, or the following features in Holocene age deposits: offset stream courses, linear scarps, shutter ridges, and triangular faceted spurs. Recency of faulting offshore is based on the interpreted age of the youngest strata displaced by faulting.

Late Quaternary fault displacement (during past 700,000 years). Geomorphic evidence similar to that described for Holocene faults except features are less distinct. Faulting may be younger, but lack of younger overlying deposits precludes more accurate age classification.

Quaternary fault (age undifferentiated). Most faults of this category show evidence of displacement sometime during the past 1.6 million years; possible exceptions are faults which displace rocks of undifferentiated Plio-Pleistocene age. Unnumbered Quaternary faults were based on Fault Map of California, 1975. See Bulletin 201, Appendix D for source data.

Pre-Quaternary fault (older that 1.6 million years) or fault without recognized Quaternary displacement. Some faults are shown in this category because the source of mapping used was of reconnaissnce nature, or was not done with the object of dating fault displacements. Faults in this category are not necessarily inactive.

ADDITIONAL FAULT SYMBOLS

Bar and ball on downthrown side (relative or apparent).

Arrows along fault indicate relative or apparent direction of lateral movement.

Arrow on fault indicates direction of dip.

Low angle fault (barbs on upper plate). Fault surface generally dips less than 45° but locally may have been subsequently steepened. On offshore faults, barbs simply indicate a reverse fault regardless of steepness of dip.

OTHER SYMBOLS

Numbers refer to annotations listed in the appendices of the accompanying report. Annotations include fault name, age of fault displacement, and pertinent references including Earthquake Fault Zone maps where a fault has been zoned by the Alquist-Priolo Earthquake Fault Zoning Act. This Act requires the State Geologist to delineate zones to encompass faults with Holocene displacement.

Structural discontinuity (offshore) separating differing Neogene structural domains. May indicate discontinuities between basement rocks.

Brawley Seismic Zone, a linear zone of seismicity locally up to 10 km wide associated with the releasing step between the Imperial and San Andreas faults.

Geologic Time Scale			Years Before Present (Approx.)	Fault Symbol	Recency of Movement	DESCRIPTION: ON LAND	DESCRIPTION: OFFSHORE
Quaternary	Late Quaternary	Historic				Displacement during historic time (e.g. San Andreas fault 1906). Includes areas of known fault creep.	
		Holocene	200			Displacement during Holocene time	Fault offsets seafloor sediments or strata of Holocene age.
			11,700			Faults showing evidence of displacement during late Quaternary time.	Fault cuts strata of Late Pleistocene age.
	Early Quaternary	Pleistocene	700,000			Undivided Quaternary faults - most faults in this category show evidence of displacement during the last 1,600,000 years, possible exceptions are faults which displace rocks of undifferentiated Plio-Pleistocene age.	Fault cuts strata of Quaternary age.
Pre-Quaternary			1,600,000*			Faults without recognized Quaternary displacement or showing evidence of no displacement during Quaternary time. Not necessarily inactive.	Fault cuts strata of Pliocene or older age.
			4.5 billion (Age of Earth)				

* Quaternary now recognized as extending to 2.6 Ma (Walker and Geissman, 2009). Quaternary faults in this map were established using the previous 1.6 Ma criterion.

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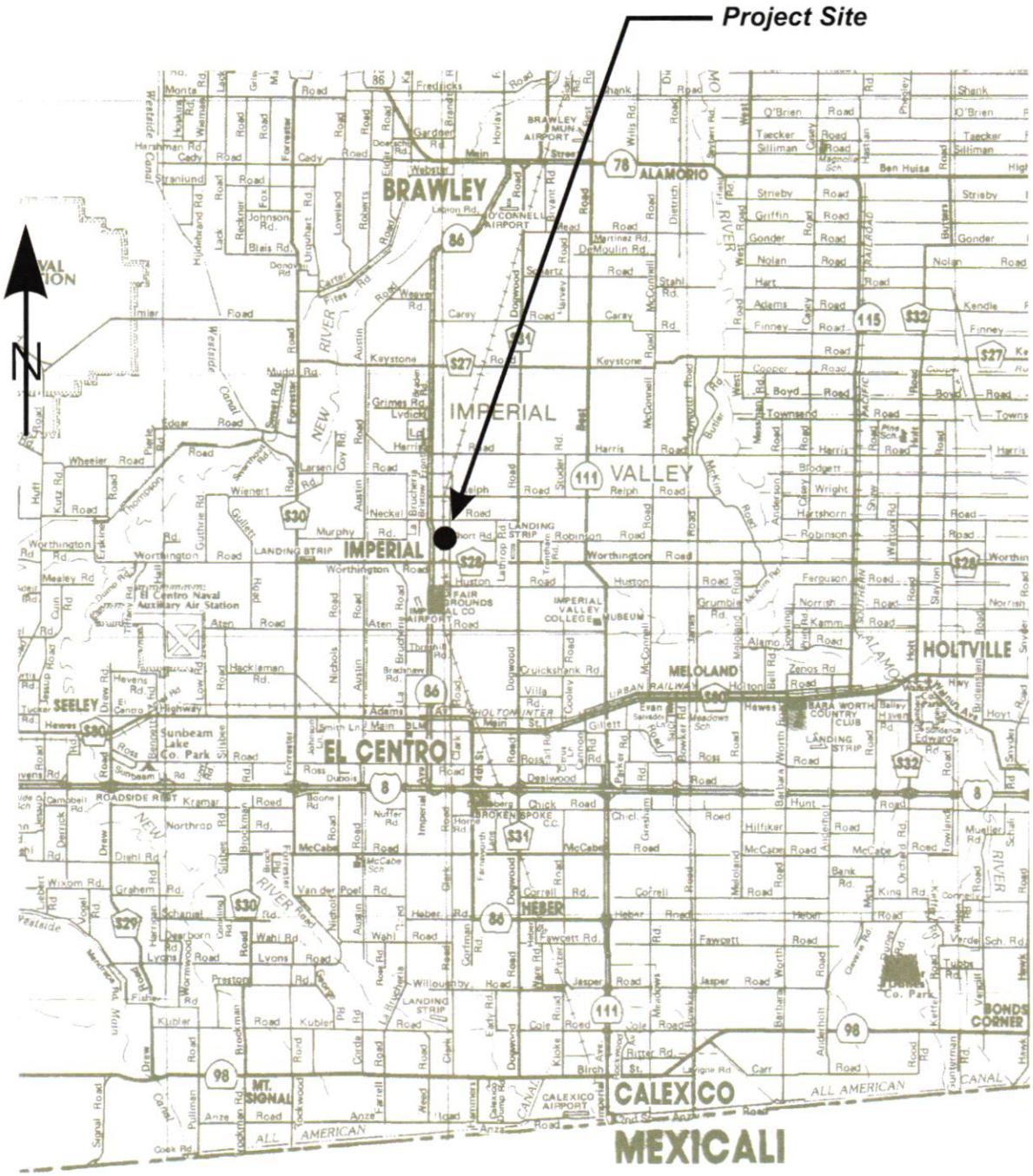
Fault Map Legend

Figure 3

APPENDIX A



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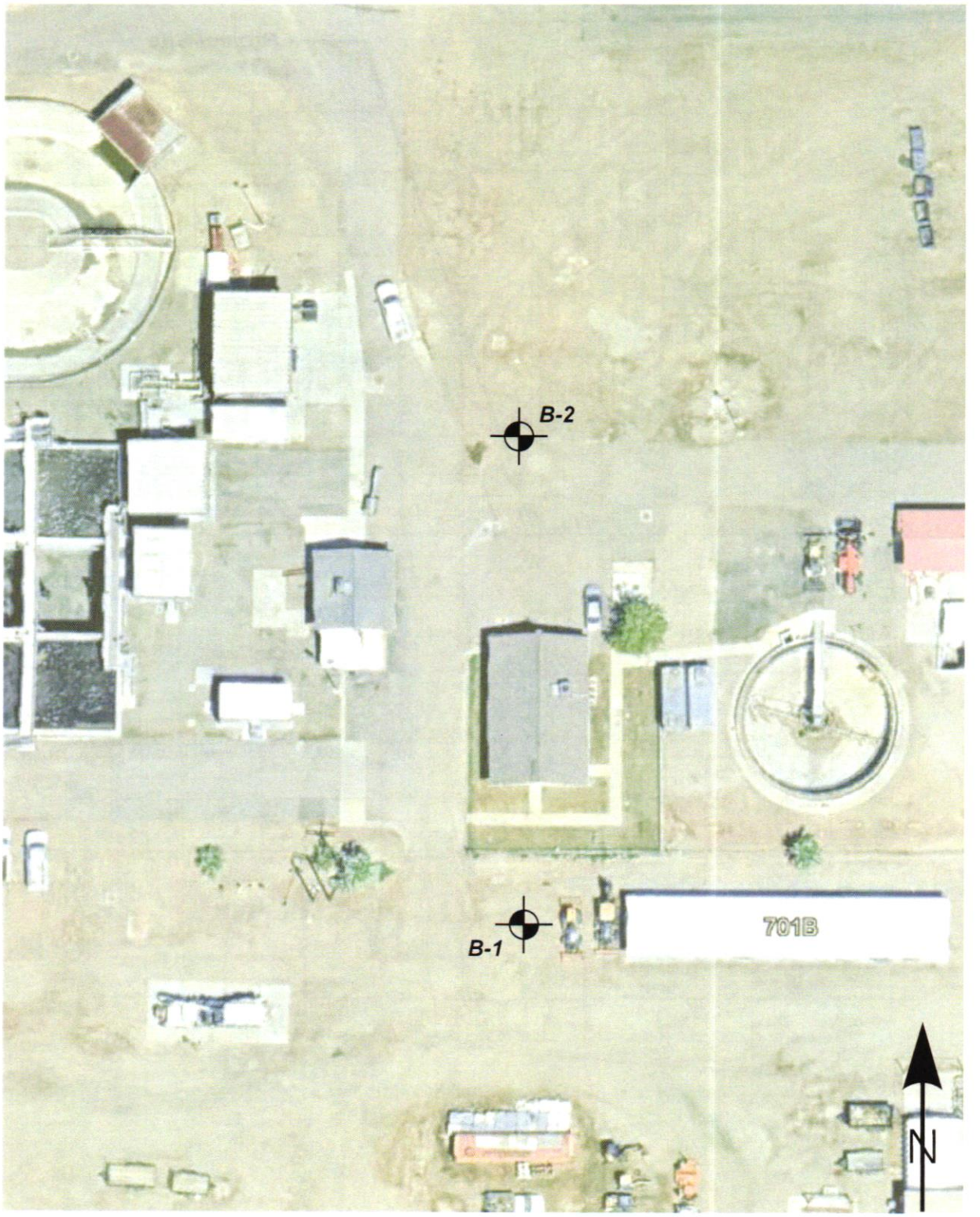
Vicinity Map

Plate
A-1



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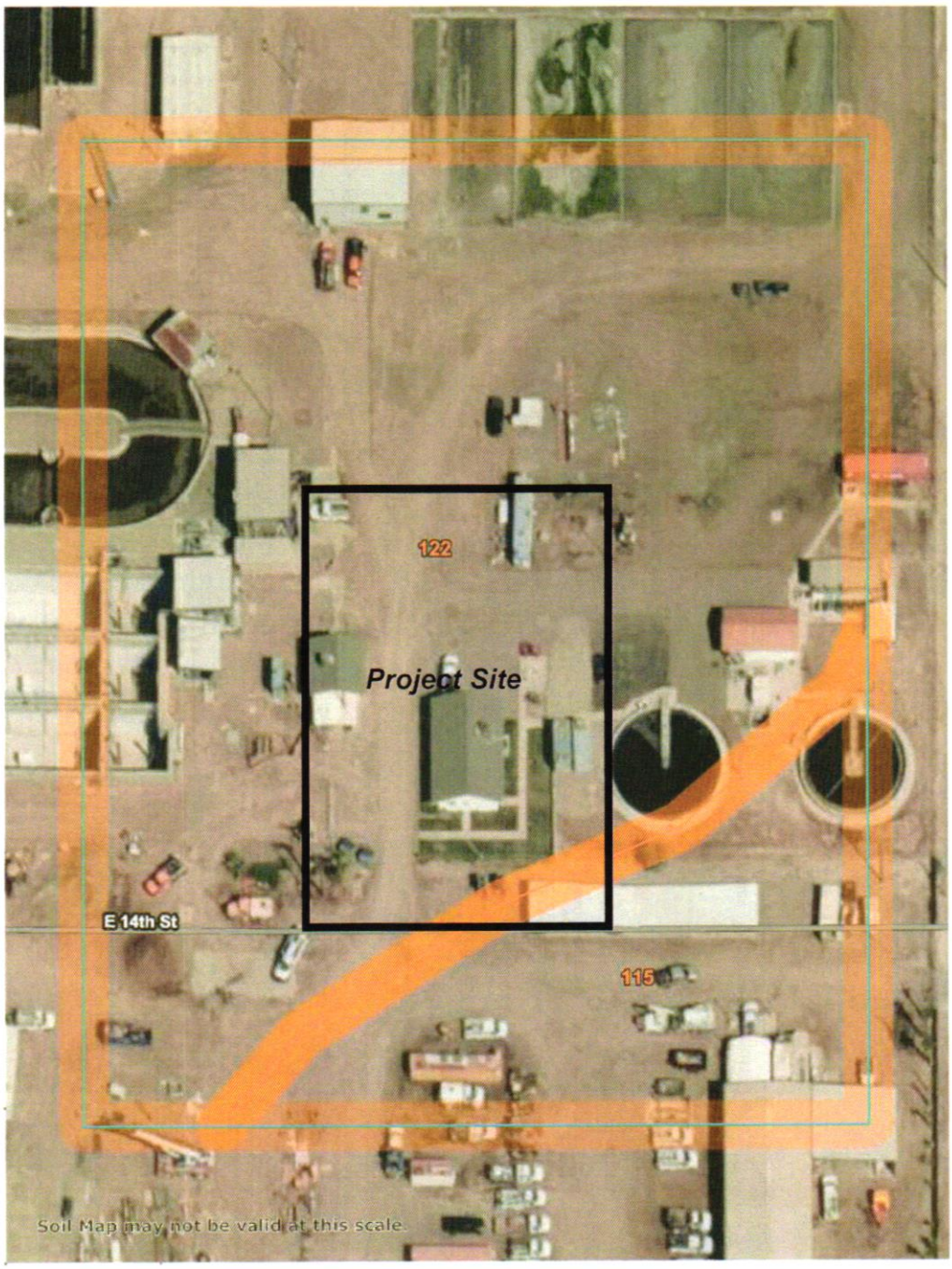
Site and Exploration Map

Plate
A-2



115° 33' 46" W

Map Scale: 1:884 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 10 20 40 60

Feet
0 40 80 160 240

Map projection: Web Mercator Corner coordinates: WGS84

115° 33' 41" W

N

USDA Natural Resources Conservation Service

Web Soil Survey
National Cooperative Soil Survey

4/28/2025
Page 1 of 3

LANDMARK Geo-Engineers and Geologists Project No.: LE25072	Soil Survey Map	Plate A-3

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Imperial County, California, Imperial Valley Area
Survey Area Data: Version 17, Sep 10, 2024

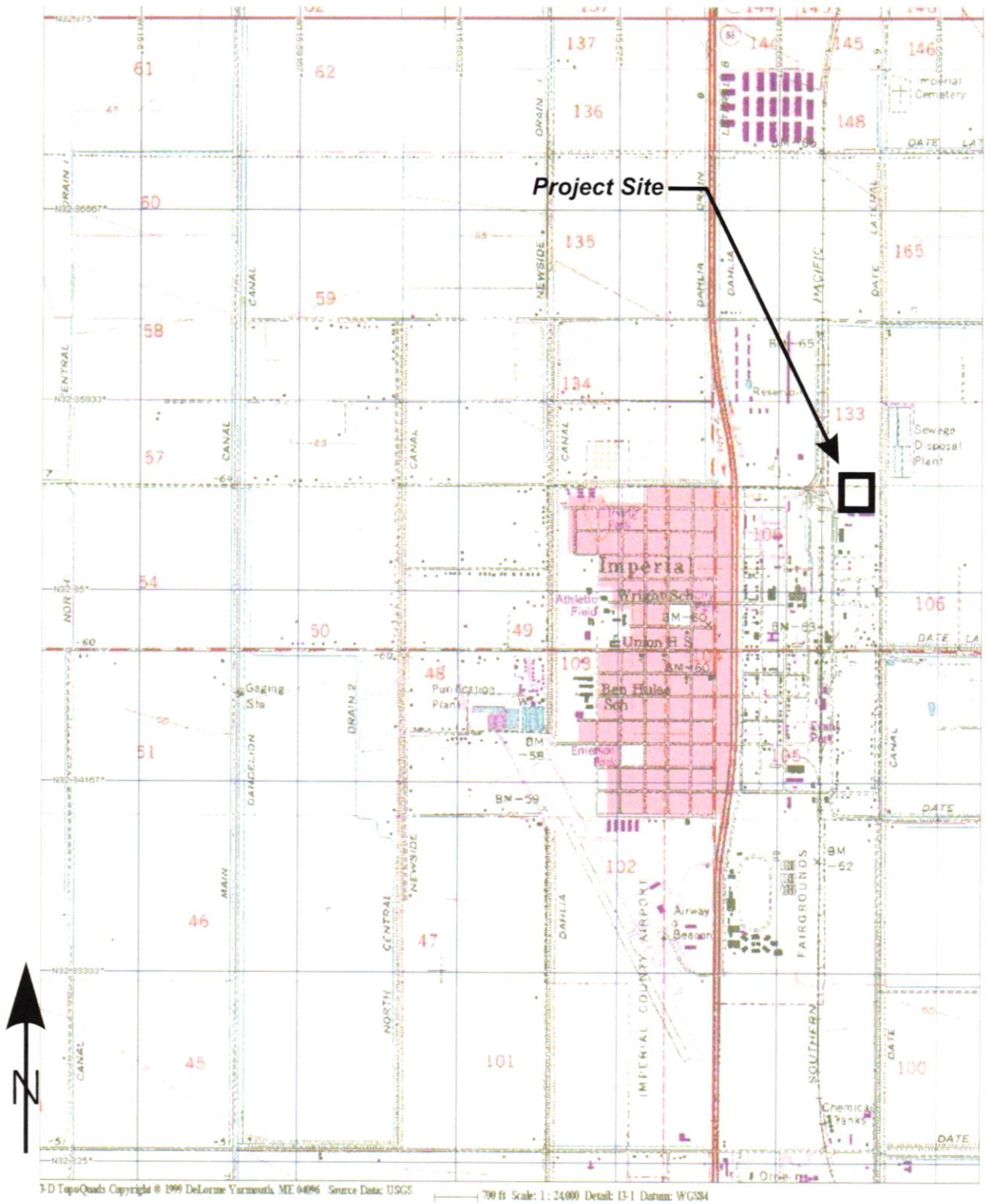
Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 17, 2021—May 22, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
115	Imperial-Glenbar silty clay loams complex, 0 to 2 percent slopes, wet	0.8	19.8%
122	Meloland very fine sandy loam, wet	3.2	80.2%
Totals for Area of Interest		**4.0**	**100.0%**



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Topographic Map

Plate A-4

APPENDIX B

LOG OF BORING No. B-1

SHEET 1 OF 1

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
					Recycled AC Aggregate (12-in) FAT CLAY (CH): Dark brown, very moist, high plasticity.			
5			11		SANDY SILT/SILTY SAND (ML-SM): Brown, moist, medium dense, fine grained sand.			
10			8	2.0	SILTY CLAY (CL): Reddish brown, very moist, stiff, medium plasticity.			
15			4		SANDY SILT/SILTY SAND (ML-SM): Brown, saturated, loose, fine grained sand.			
20			8					
25			12	2.5	SILTY CLAY/CLAY (CL-CH): Dark brown, very moist, very stiff, medium to high plasticity.			
30			11	3.5				
35			5	0.5	CLAYEY SILT (ML): Brown, saturated, soft, low plasticity.			
40			10	2.0	SILTY CLAY/CLAY (CL-CH): Dark brown, very moist, stiff, medium to high plasticity.			
45					Total Depth = 41.5 ft. Groundwater encountered at a depth of 13.0 ft. at time of drilling. Groundwater level stabilized at 9 feet after 24 hours Backfilled with excavated soil			
50								
55								
60								

DATE DRILLED: 4/8/25 | TOTAL DEPTH: 41.5 feet | DEPTH TO WATER: 9.0 ft.

LOGGED BY: A. Morales | TYPE OF BIT: Hollow Stem Auger | DIAMETER: 8 in.

SURFACE ELEVATION: Approximately -65' | HAMMER WT.: 140 lbs. | DROP: 30 in.

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PLATE B-1

DEFINITION OF TERMS

PRIMARY DIVISIONS			SYMBOLS	SECONDARY DIVISIONS
Coarse grained soils More than half of material is larger that No. 200 sieve	**Gravels** More than half of coarse fraction is larger than No. 4 sieve	Clean gravels (less than 5% fines)	**GW**	Well graded gravels, gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels, or gravel-sand mixtures, little or no fines
		Gravel with fines	**GM**	Silty gravels, gravel-sand-silt mixtures, non-plastic fines
			GC	Clayey gravels, gravel-sand-clay mixtures, plastic fines
	Sands More than half of coarse fraction is smaller than No. 4 sieve	Clean sands (less than 5% fines)	**SW**	Well graded sands, gravelly sands, little or no fines
			SP	Poorly graded sands or gravelly sands, little or no fines
		Sands with fines	**SM**	Silty sands, sand-silt mixtures, non-plastic fines
			SC	Clayey sands, sand-clay mixtures, plastic fines
Fine grained soils More than half of material is smaller than No. 200 sieve	**Silts and clays** Liquid limit is less than 50%		**ML**	Inorganic silts, clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravely, sandy, or lean clays
			OL	Organic silts and organic clays of low plasticity
	Silts and clays Liquid limit is more than 50%		**MH**	Inorganic silts, micaceous or diatomaceous silty soils, elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity, organic silts
Highly organic soils			**PT**	Peat and other highly organic soils

GRAIN SIZES

Silts and Clays	Sand			Gravel		Cobbles	Boulders
	Fine	Medium	Coarse	Fine	Coarse		
	200	40	10 4	3/4"	3"	12"	
	US Standard Series Sieve			Clear Square Openings			

Sands, Gravels, etc.	Blows/ft. *
Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	Over 50

Clays & Plastic Silts	Strength **	Blows/ft. *
Very Soft	0-0.25	0-2
Soft	0.25-0.5	2-4
Firm	0.5-1.0	4-8
Stiff	1.0-2.0	8-16
Very Stiff	2.0-4.0	16-32
Hard	Over 4.0	Over 32

* Number of blows of 140 lb. hammer falling 30 inches to drive a 2 inch O.D. (1 3/8 in. I.D.) split spoon (ASTM D1586).

** Unconfined compressive strength in tons/s.f. as determined by laboratory testing or approximated by the Standard Penetration Test (ASTM D1586), Pocket Penetrometer, Torvane, or visual observation.

Type of Samples:

Ring Sample Standard Penetration Test Shelby Tube Bulk (Bag) Sample

Drilling Notes:

1. Sampling and Blow Counts
   - Ring Sampler - Number of blows per foot of a 140 lb. hammer falling 30 inches.
   - Standard Penetration Test - Number of blows per foot.
   - Shelby Tube - Three (3) inch nominal diameter tube hydraulically pushed.
2. P. P. = Pocket Penetrometer (tons/s.f.).
3. NR = No recovery.
4. GWT = Ground Water Table observed @ specified time.

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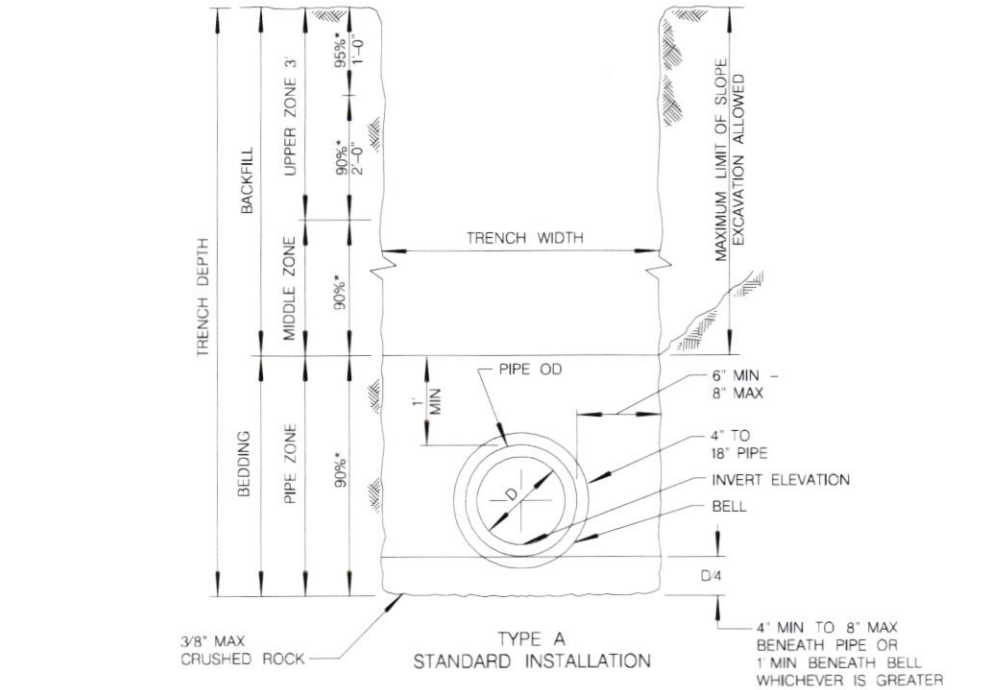
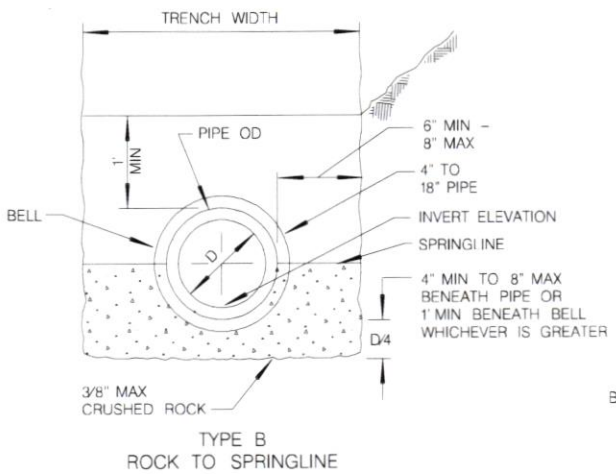
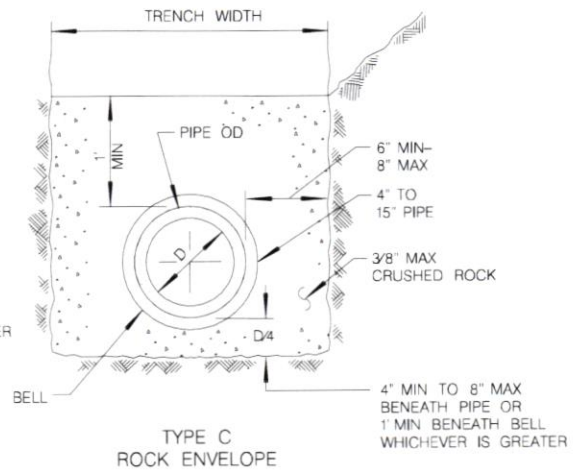
Key to Logs

Plate
B-2

APPENDIX C







NOTES

1. FOR TRENCH RESURFACING IN IMPROVED STREETS, SEE STANDARD DRAWINGS SDG-107 AND SDG-108.
2. (*) INDICATES MINIMUM RELATIVE COMPACTION.
3. MINIMUM DEPTH OF COVER FROM THE TOP OF PIPE TO FINISH GRADE FOR PVC SDR 35 SEWER MAIN SHALL BE 5'. FOR SHALLOWER DEPTH, SPECIAL DESIGN IS REQUIRED. SEE SDS-101.
4. SEE TYPE A INSTALLATION FOR DETAILS NOT SHOWN FOR TYPES B AND C.
5. FOR PIPE SIZE ENCASEMENT LARGER THAN 15", MAXIMUM SIDE WALL CLEARANCE SHALL BE 12" OR AS SHOWN ON THE PLANS.
6. 6" METAL TAPE SHALL BE INSTALLED ABOVE PIPE 4" BELOW TRENCH CAP AND 12" BELOW FINISH GRADE IN UNIMPROVED STREETS.
7. 1' SAND CUSHION OR A 6" MINIMUM SAND CUSHION WITH 1" NEOPRENE PAD SHALL BE PLACED FOR CROSSINGS UTILITIES WHEN VERTICAL CLEARANCE IS 1' OR LESS. THE NEOPRENE PAD SHALL BE PLACED ON THE MOST FRAGILE UTILITY.

From: City of San Diego Standard Drawing SDS-110 (2016)

LANDMARK Geo-Engineers and Geologists **Project No.: LE25072**	**Pipe Bedding and Trench Backfill Recommendations**	**Plate C-1**