Bi-National Canal for Salton Sea Restoration and Colorado River Augmentation

Proposal to the California Natural Resources Agency in Response to December 8, 2017 Request for Information for Salton Sea Water Importation Projects

Submitted by: GEI Consultants, Inc. and Michael Clinton Consulting, LLC March 9, 2018

TABLE OF CONTENTS

EXECUTIVE SUMMARY LETTER

March 9, 2018

Bruce Wilcox, Assistant Secretary for Salton Sea Management
California Natural Resources Agency
1416 Ninth Street, Suite 1311
Sacramento, CA 95814

Subject: Request for Information for Salton Sea Water Importation Projects

Dear Mr. Wilcox:

In response to the Agency's Request for Information dated December 8, 2017, GEI Consultants, Inc. (GEI) and Michael Clinton Consulting, LLC (MCC) are pleased to present our proposal to the California Natural Resources Agency ("the Agency") to provide professional water resource development services to formulate and implement a comprehensive program to restore the Salton Sea, augment Colorado River water supplies, and contribute to balancing statewide water supply security. As suggested in the first paragraph of the RFI, our proposal is "designed to address public and ecological health issues at the Salton Sea while securing Colorado River water supplies for the state."

The Agency's "Ten Year Plan" sets in motion a series of actions that will help to mitigate dust generated from the exposed playa as the elevation of the Sea recedes. The Ten Year Plan will also create a series of small open water habitat areas on the playa to help sustain migrating and local fish and bird species. This will maintain essential functions of this critical portion of the Pacific Flyway. It will also intend to address a looming public health crisis by stabilizing the playa surface to minimize wind- blown particulates. However, the salinity of the much-larger Salton Sea will continue to approach a level poisonous to fish and birds, and there is uncertainty regarding the effectiveness of dust control methods over such a large area of exposed playa.

An equally perilous concern is that the structural water supply deficit on the Colorado River and the declining Lake Mead elevations will create a growing jeopardy to the future of Colorado River water supplies of the State of California, the other Basin States, and Mexico. This proposal is designed to address each of these critical concerns. Not only would the Colorado River Augmentation included in this proposal be a means to support statewide water supply security but would also be the last-best opportunity to meet the mandate of Section 202 of Public Law 90-537 which made the delivery of water to Mexico a "national obligation" and directed the Secretary of the Interior to develop a Colorado River augmentation plan for consideration by the Congress. All previous attempts were ceased. The 1960's studies of imports from the Columbia River were halted by the Congress; the 1970's Westwide Studies were stopped by the Carter Administration; and the suggestion by the

Southern Nevada Water Authority to bring Missouri River water to the Colorado front-range cities was rejected. The last great source of proximate, unobligated water supply is in the Gulf of California.

GEI is a nation-wide consulting engineering firm with five offices in California and a diverse staff that has expertise in virtually all aspects of California and Colorado River water management. GEI is experienced in a wide portfolio of water resources engineering that has ranged from very broad regional studies to very project-specific undertakings. GEI's Team will provide the Agency with its invaluable local knowledge and extensive experience in water resources planning and management throughout the Colorado River System, in the Colorado River Delta area of Mexico, the Imperial, Coachella and Mexicali valleys and the Salton Sea.

GEI, through Program Manager, Marc Rozman, PE, and Project Manager, Mark Williamson, PE, bring to the program a long history of successfully completing projects on time and within budget. GEI provides a strong link to the Agency through its Sacramento Office, which will have the lead for keeping Sacramento staff informed as the project evolves.

Mike Clinton, PE has conceived the proposed program and managed the extensive four-year inter-agency dialog that has refined the Project concepts to those displayed in the proposal. Through the Feasibility Stage and on into implementation, Mike will continue the needed liaison with interested parties and agencies and will take the lead in developing the multitude of contracts and agreements needed for Project implementation.

Jeff Harvey, PhD, brings the experience of managing environmental compliance for many large water and power projects in the Sonoran Desert area of southern California, including representing the San Diego County Water Authority in matters related to the Salton Sea and the transfer of IID conserved water to San Diego. Jeff brings to the project terrestrial biologists that know the area and have experience in dealing with the resource agencies and interested parties in the area. Jeff will oversee the environmental compliance aspects of the Project, providing quality control and high-level agency and interest group coordination. For example, Jeff, located in Palm Desert, will also provide needed local liaison with the Agency Assistant Secretary for Salton Sea Management who is located nearby.

Our proposed partner, CEMEX, brings world-class project management and construction experience within both the United States and Mexico, both crucial ensure that the Salton Sea Water Importation Project and Colorado River Augmentation Program will be implemented on time and within budget. CEMEX will focus their outstanding international expertise and project construction capabilities on the early restoration of the Salton Sea and augmentation of the Colorado River water supply.

Overall, working along with CEMEX's noteworthy background and capabilities, GEI will leverage their own local knowledge and prior work experience to trade time spent in getting up to speed for more time spent on adding value. Our interdisciplinary structure allows the GEI Team to assume full responsibility for this entire project from concept through operation.

We have outlined what we believe will be a very successful strategy and program to implement this important work.

Thank you for the opportunity to outline our scope of work to help the Agency with this effort. We look forward to speaking with you further about this project. If you have any questions, please contact Marc Rozman at 818.552.6430 (mrozman@geiconsultants.com), Mark Williamson at 916.631.4559 (mwilliamson@geiconsultants.com), or Mike Clinton at 702.807.9071 (mcenginr@aol.com).

Respectfully submitted,

GEI Consultants, Inc.

Marc Rozman, PE
Vice President, Program Manager

Michael Clinton Consulting, LLC

Michael J. Clinton, PE
President, Michael Clinton Consulting, LLC

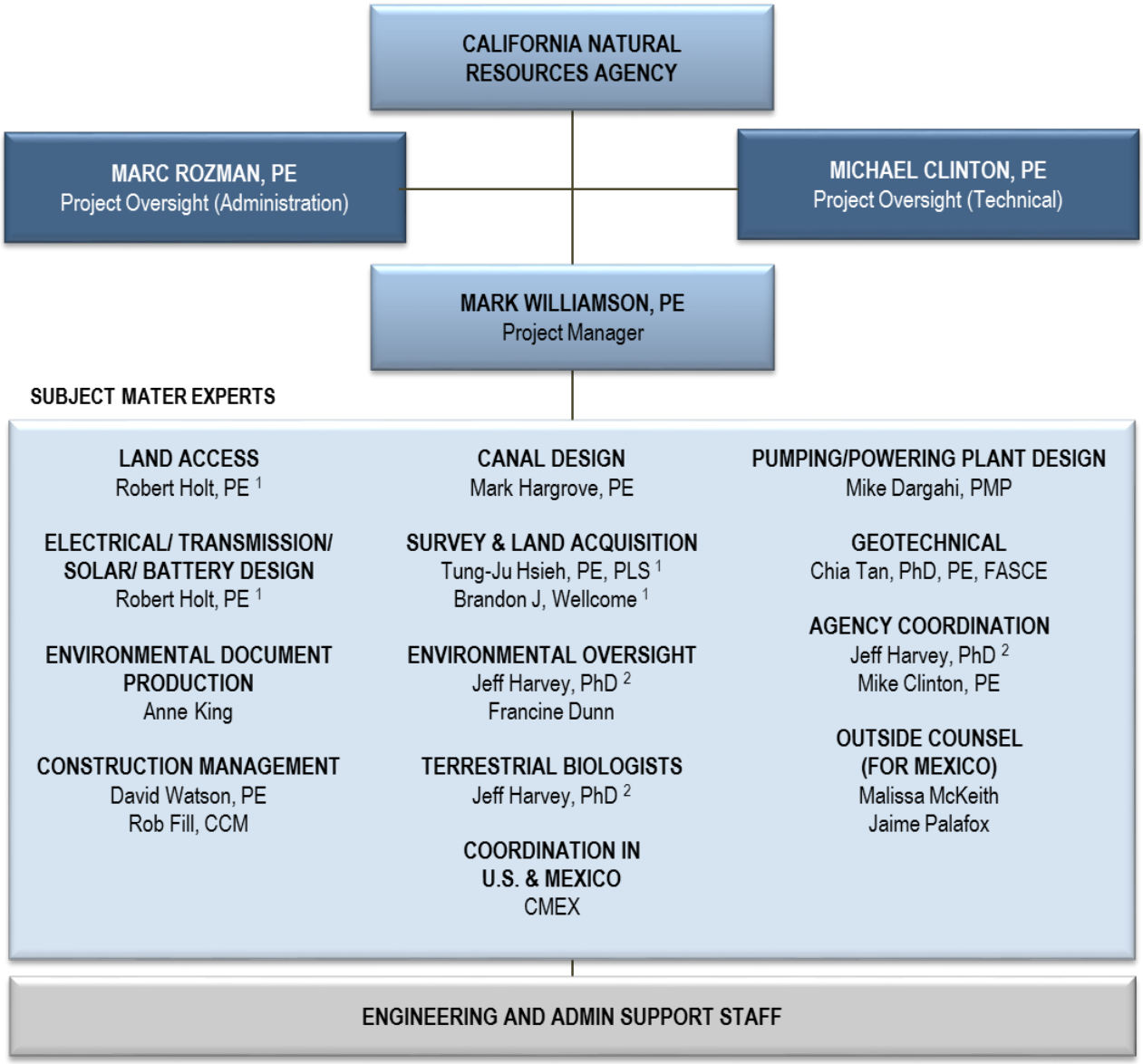
1 IDENTIFICATION OF PROJECT TEAM

NOTE: Text requirements from the RFI are shown in italics at the beginning of each section.

Identification of Project Team – *Members of the project team, and their roles on the project should be identified.*

GEI and MCC have assembled a world class team of subject matter specialists for this work. These individuals are identified in the organizational chart **(Figure 1)** below. Resumes for key staff are provided in **Appendix A.** Resumes for the other staff shown in the organization will be provided on request.

FIGURE 1. PROJECT TEAM ORGANIZATION



2 NARRATIVE DESCRIPTION OF PROJECT CONCEPTS AND HOW/WHEN IT WILL BENEFIT THE LAKE

Narrative Description of Project Concept and How/When it Will Benefit the Lake – *A brief description of the proposed project is required that includes a general discussion of the project concept, the business plan and the implementation of the project. The project concept discussion should include a description of the project and how it will improve conditions at the lake. The business plan should include a discussion of the ownership of the proposed project and the plan for generating revenue from the project.*

Proposed Project Plan: The proposed project would be implemented in two phases, as follows:

> ***Phase 1.*** Importation of water from the Gulf of California to the Salton Sea (a State of California responsibility)
>
> ***Phase 2.*** Withdrawal and desalination of a portion of the imported water to remove salts from the Salton Sea; deliver the desalinated water to the canals of the Imperial Irrigation District (IID) and Coachella Valley Water District (CVWD); and, by exchange through reduction in demands on the Colorado River and Lake Mead, accomplish the augmentation of the Colorado River that was anticipated in 1968 when the Central Arizona Project was authorized by the Congress (a federal and seven basin states responsibility)

Implementation of Salton Sea Restoration: Import of water from the Gulf will use known and proven technology to convey the water approximately 135 miles from an intake located on the Gulf

northeast of San Felipe, north to the Salton Sea. The conveyance system will use a single 100 foot-lift pumping plant, a single four-mile long tunnel under the International Boundary and about 130 miles of 3,200 cubic feet per second (cfs) gravity canals, comparable in size to the recently lined All American Canal near Drop 2.[1] At the north end of the canal system, a tunnel will convey the water to the Salton Sea outlet. This tunnel segment includes a 225-foot drop, which will be equipped with a hydroelectric generator to produce peaking power during an estimated 5,000 hours per year.

With an expedited schedule of two years to complete a feasibility study, fully mitigated Environmental Review, and the form of needed agreements, followed by a two- to three-year construction period, Gulf water could be flowing to the Salton Sea by 2023. Using a three-year fill period to minimize seismic risks associated with the weight of the restored Salton Sea on the crust of the earth, the sea would be at elevation -225 by mid-2025/2026 with the playa fully submerged. The dilution effect of the Gulf water would bring the Salton Sea salinity to about 50,000 mg/l in 2025. The Salton Sea salinity would continue to decline over a period of several years to a steady state of about 39,000 mg/l, which is the blend of the salinity of Gulf water and waters from the New, Alamo and Whitewater Rivers, less exported salts.

Salton Sea Restoration Business Plan: Since the State of California agreed in 2003 to assume the financial obligation for Salton Sea Restoration, the cost of constructing the needed importation facilities would be provided through a Continuing Appropriation by the California Legislature. It is proposed that the facilities be constructed by the GEI Team, that facilities in Mexico be owned, operated, and maintained by the Mexico Federal Water Agency, CONAGUA, and that facilities in the United States be owned by the State of California and operated and maintained by the IID. Funding for all operations, maintenance, and repair of facilities in Mexico and in the United States would derive from hydropower generation revenue, and remuneration for water from the IID and CVWD entitlements that can be transferred to other basin states. Funding contributions for the infrastructure should also be sought from the federal government and other basin states that will benefit from the Colorado River water supply augmentation. Additional revenue sources will be explored in the feasibility study, including possible sale of minerals recovered in the desalination process, and increased property tax revenues from Salton Sea shoreline communities.

Power to operate the pumps at the 100-foot lift pumping plant near the Mexicali/San Felipe Highway would be provided by a solar panel array placed on the west bank of the canal alignment

[1] GEI was responsible for the design and construction management for lining the All American Canal and the Coachella Canal, and our environmental team leader, Dr. Jeff Harvey, was Environmental Program Advisor for those projects as well.

north of the pumping plant and battery-storage system. Power for the 100-mm fish screen and ozone disinfection equipment located at the mouth of the tunnel will be provided by IID through an interchange with San Diego Gas and Electric (SDG&E) at its Imperial Valley Substation; SDG&E would arrange for a five-mile 12.5 kV under build on an existing CNA 230-kV lattice-tower power line between the existing SDG&E substation west of Mexicali and the tunnel inlet site.

Implementation of Colorado River Augmentation Program: To maintain the reduced salinity of the Salton Sea, the tons of salt entering the Sea from the Gulf of California, and the New, Alamo and Whitewater Rivers (about 60 million tons per year) must be removed. The proposed Project anticipates removing this mass of salt along with about 2.0 million acre-feet per year (MAF/year) with an initial salinity of about 60,000 mg/l and a long-term salinity of about 39,000 mg/l. Desalination of this 2.0 MAF/year provides the opportunity to augment the Colorado River.

The desalination will use a proprietary distillation process powered by three 50-MW sled mounted natural gas-fired generators, which will provide power for operation of the Project, and heat for the desalination process. Since the product of the process is distilled water which is chemically very aggressive, the Project includes a two-pipeline exchange of 200,000 AF/year of distilled product water for 200,000 AF/year of Colorado River water in the nearby Coachella Canal. This exchange will reduce the salinity of Colorado River water used by CVWD from about 600 mg/l to about 300 mg/l. The 200,000 AF/year of Colorado River water received from the Coachella Canal will be blended with the remaining 1.8 MAF/year of distilled product water from the desalination facility and delivered into the IID canals for use in lieu of water ordered from the Colorado River and Lake Mead. Delivery of that blend to the IID system will be through lining of the East Highline Canal and using a system in which water in the lower pool is pumped up and over the check structures, ultimately reaching the All American Canal below Drop 3. This delivery of desalinated water will reduce the salinity of Colorado River water used by the Imperial Irrigation District from about 600 mg/l to about 300 mg/l, and as a result, over time, the salinity of the New River and Alamo River waters entering the Salton Sea should also decrease significantly.

The distillation desalination process is a zero-liquid-discharge process with the outputs being distilled water and salts and minerals. Through a sequential distillation process, different salts will precipitate and be removed at different stages, some of which may have commercial value. A three-mile conveyor system will deliver the solid materials to the Union Pacific Railroad siding near the turnoff to the Niland Marina Road. The UP Railroad would be contracted with to transport the solid material to markets and disposal sites.

Phase 2 – Colorado River Desalination Business Plan: The Lower Colorado System now delivers about 9.5 MAF/year to water users in the United States and Mexico. The sustainable supply at Hoover Dam is about 8.4 MAF/year, leaving a "structural water supply deficit" of about 1.1 MAF/year. Resolving this deficit is the objective of this part of the proposed Project.

When the Central Arizona Project (CAP) was authorized by the Congress in 1968, it was widely recognized that there was not enough water in the Colorado River to meet future demands. Accordingly, studies of augmentation were authorized but no project was identified. Also, Section 202 of P.L. 90-537 stipulates that:

> "The Congress declares that the satisfaction of the requirements of the Mexican Water Treaty from the Colorado River *constitutes a national obligation* which shall be the first obligation of any water augmentation project planned pursuant to section 201 of this Act and authorized by the Congress." *(Emphasis Added)*

Accordingly, the business plan for this portion of the Project contemplates the United States funding the cost of the desalination and exchange/delivery systems. The form of federal legislation would be developed during the two-year Feasibility Study and Environmental Review period.

Relations with Mexico: An important component of the Project will be providing an appropriate quid-pro-quo for Mexico for allowing diversion and delivery of Gulf water to the Salton Sea. Augmentation and eliminating the structural water supply deficit on the Lower Colorado River will be a significant benefit to Mexico, which agreed in Minute 323 to share Colorado River shortages with water users in the United States. This agreement is a long-term insurance policy for Mexico and will not provide any immediate benefit. Therefore, some immediate asset transfer to Mexico is needed.

Relationship with Upper Basin States: Section 202 of P.L. 90-537 stipulates:

> "SEC. 202. The Congress declares that the satisfaction of the requirements of the Mexican Water Treaty from the Colorado River constitutes a national obligation which shall be the first obligation of any water augmentation project planned pursuant to section 201 of this Act and authorized by the Congress. Accordingly, the States of the Upper Division (Colorado, New Mexico, Utah, and Wyoming) and the States of the Lower Division (Arizona, California, and Nevada) shall be relieved from all obligations which may have been imposed upon them by article III(c) of the Colorado River Compact so long as the Secretary shall determine and proclaim that means are available and in operation which augment the water supply of the Colorado River system in such quantity as to satisfy the requirements of the Mexican Water Treaty together with any losses of water associated with the performance

> of that treaty: Provided that the satisfaction of the requirements of the Mexican Water Treaty (Treaty Series 994, 59 Stat. 1219), shall be from the waters of the Colorado River pursuant to the treaties, laws, and compacts presently relating thereto, until such time as a feasibility plan showing the most economical means of augmenting the water supply available in the Colorado River below Lee's Ferry by two and one-half million acre-feet shall be authorized by the Congress and is in operation as provided in this Act.

Therefore, when the Colorado River is augmented by 2.5 MAF/year., "the States of the Upper Division (Colorado, New Mexico, Utah, and Wyoming) … shall be relieved from all obligations which may have been imposed upon them by article III(c) of the Colorado River Compact..." Thus, the Upper Basin States that now must deliver half of the Mexican Treaty obligation (750,000 AF/year will be relieved of that obligation and be allowed to further develop their Upper Bain Compact entitlement.

Lining the East Highline Canal: The lining of the canal will conserve up to an estimated 100,000 AF/year of conserved water. It is proposed that 100,000 AF/year be offered for sale to Mexico by IID on a commercial basis so that it can be delivered in addition to Mexico's 1.5 MAF/year treaty entitlement. A phased delivery schedule may be considered to match the Project implementation schedule.

The Mexico Section of the International Boundary and Water Commission (IBWC) has suggested that a new Minute to the treaty be developed to memorialize the Project relationships and responsibilities among various stakeholders. Accordingly, such a draft Minute will be prepared during the two-year Feasibility Study and Environmental Review development period.

Implementation Schedule: The distillation Facility is being designed to operate with the Salton Sea at or above elevation -225. Since this would occur in about 2025, construction of the Phase 2 facilities would be scheduled in the 2022 to 2025 period. During the 2019-2021 period, modeling, design and pilot project demonstration of the proposed distillation facility will be conducted.

3 PLANNING AND DESIGN PROCESS OF THE PROJECT

Planning and Design Process of Project – *Describe the planning process completed to date and detail how the planning process will be completed.*

The planning and design process for the project began in 2014 with development of the initial project configuration. As presented on February 24, 2016, to a gathering hosted by Assistant Secretary Wilcox, the concept presentation included development of a deep-water port in the Laguna Salada with a set of locks and a dam. It also included delivery of Gulf water to the Salton Sea and a return canal to return salt concentrate to the Gulf at a location south of San Felipe. With feedback from various interests, the locks, dam, port facility and return of salt concentrates to the Gulf were removed from the plan. This left the accumulation of salts in the Salton Sea needing to be resolved.

After calculating the volume of water (and salt) that would need to be removed from the Sea to maintain a sustainable salt balance in the Sea, it was observed that the volume approached the quantity of water needed to address the structural water supply deficit in the Lower Colorado River Basin. In the process of evaluating various locations for the desalination facility, it was determined that a site at the end of the East Highline Canal, at the terminus of the Niland Marina Road closest to the Coachella Canal and near a siding on the UP Railroad addressed most siting issues. Some plans included a peaking forebay in Mexico at the north end of the Laguna Salada, but that reservoir was moved to the West Mesa and near to the Salton Sea to reduce canal costs. The current configuration was then finalized, hydrologic and energy balances completed with cost estimates and preliminary identification of environmental issues completed.

Section 202 of P.L. 90-537 stipulates:

> "That the satisfaction of the requirements of the Mexican Water Treaty (Treaty Series 994, 59 Stat. 1219), shall be from the waters of the Colorado River pursuant to the treaties, laws, and compacts presently relating thereto, until such time as a feasibility plan showing the most economical means of augmenting the water supply available in the Colorado River below Lee's Ferry by two and one-half million acre-feet shall be authorized by the Congress and is in operation as provided in this Act."

The diversion of 2.5 MAF/year of water from the Gulf and the use of that water to restore the Salton Sea and augment the Colorado River appear to satisfy that mandate.

The planning process has also included extensive consultation with the California Natural Resources Agency, U.S. Bureau of Reclamation, Imperial Irrigation District, the Coachella Valley Water District and the U. S. and Mexico Sections of the International Boundary and Water Commission. We have also had preliminary discussions with the Pacific Institute and the Salton Sea Authority.

3A PROJECT FEASIBILITY

Project Feasibility – *Documentation of the engineering feasibility of the project. Documentation should include at a minimum: system capacity; pumping requirements; channel and pipe size; water quality; other associated infrastructure such as desalinization, fish or trash screens, etc.; and expected energy use.*

Engineering Feasibility

Engineering Feasibility of the Project is demonstrated by facility layout on topographic maps, including time-tested facilities such as canals, tunnels and pumping/power plants; inclusion of facilities to address environmental issues; use of renewable energy at the only pumping plant (avoiding power line construction in a sensitive area) and anticipating use of a desalination process that has no liquid discharge and relies on natural gas for needed heat and electric energy.

Appendix B includes the plan and profile topographic maps for each of the Project facilities as well as cross-sectional drawings of various canal reaches and facilities. The cross-sectional drawings also include the hydraulic characteristics (slope, area, velocity, etc.) of the various canal reaches.

Note that Appendix B referenced above does not include detail on the proposed distillation process which we consider to be proprietary. We are prepared to discuss those concepts with the evaluation team.

Economic Feasibility

Phase 1. The Salton Sea restoration component is estimated to cost about $2 billion dollars, including land acquisition and environmental compliance/mitigation, and would have an annual O&M cost of about of about $8 million per year. As to the benefits of Phase 1, they can be compared to the early plan advanced by the State of California with a cost of $9 billion. Another measure of benefits could be expressed as avoided damages. The Pacific Institute has suggested that the present worth of such damages would be in the $50 billion or more range. The peaking power

produced at the hydro-drop (225') into the Salton Sea would generate about 205,000 MWH/hours per year and at a value of $50 per MWH/hour would have a value of about $13 million per year.

Other benefits would be expected, including construction and O&M jobs in the disadvantaged areas of Imperial County and Baja, California, improved air quality, recreation opportunities, and fish and wildlife enhancement. As a part of the proposed feasibility study, a more complete evaluation of costs and benefits in both the United States and Mexico would be developed.

Phase 2. Desalination of water from the Salton Sea and its use to augment the Colorado River by 1.9 MAF/year is estimated to cost about $1 billion with annual OM&R costs of $42 million per year.

Environmental Feasibility

In configuring the Project, care has been taken to avoid, where feasible, sensitive environmental areas. For example, no Indian Reservation lands are used and the U.S. Navy bombing ranges on the West Mesa of Imperial County are avoided. In addition, the water imported from the Gulf will be screened with a 1-mm traveling screen located in the mouth of the tunnel passing under the International Boundary and water in the tunnel will be sterilized with Ozone, thus preventing any biota transfer between the two nations.

Some sensitive environmental areas could not be avoided. These include, but are not limited to, the canal crossing of the Alto Golfo de California Biosphere Reserve at the north end of the Sea of Cortez, the lining of the East Highline Canal where the existing seepage sustains some valuable habitat as well as the new canal alignment, re-regulating reservoir, penstock and power plant on the West Mesa, all of which are in areas populated by the flat-tailed horned lizard. Desert tortoise habitat will be crossed by the canal in both Mexico and the United States. During the proposed Feasibility Study, our team of environmental scientists may identify other areas of environmental concern.

In developing the Environmental Review, the GEI team will consult with resource agencies and interest groups in the United States and Mexico to identify procedures to mitigate all significant environmental impacts. Therefore, when the draft Environmental Review is presented for approval it will include strategies to mitigate all significant environmental impacts, confirming the environmental feasibility of the Project.

We will also undertake to inventory and recognize all of the significant environmental benefits of the proposed Project. For example, restoring the Salton Sea to full volume and reduced salinity will provide tremendous environmental benefits ranging from air quality and public health locally and regionally, to high quality habitat for endangered species and the full host of migratory bird species that have come to depend upon this area as a critical link in the Pacific Flyway, a benefit which extends to State, national and international interests. Resolution of the Lower Colorado River Basin structural water supply deficit will also avoid a wide range of environmental impacts that may otherwise be incurred as each of the seven basin states and Mexico independently implements myriad projects to enhance and improve reliability of their water supplies, including additional dams and reservoirs, over-pumping of groundwater, and desalination of brackish groundwater. Finally,

through mitigation measures to be explored, we believe we can develop opportunities to provide additional water that can be applied for some level of restoration of the Colorado River delta.

3B WATER SOURCE IDENTIFICATION

Water Source Identification – *Either provide documentation from the water rights holder that establish the willingness of the water rights holder to allow use of their water right or provide a detailed description of the process to establish those rights.*

Water Source Identification

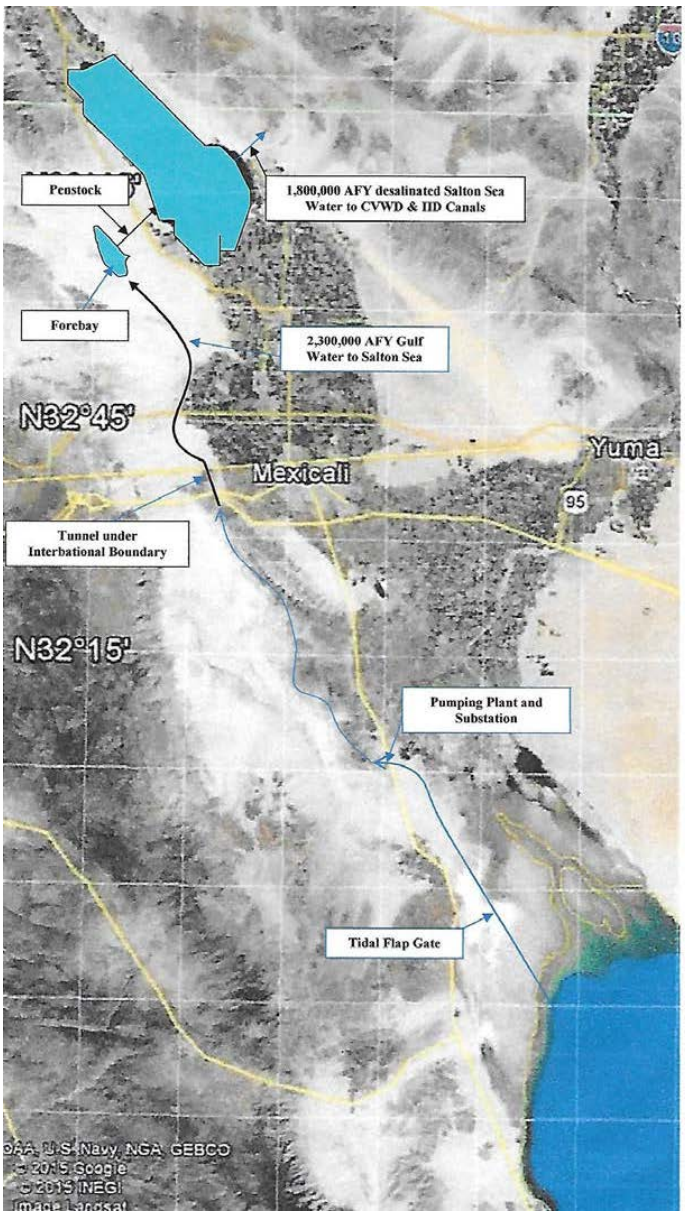
The source of water for the Project is the Gulf of California (Gulf), sometimes called "The Sea of Cortez." In consultation with the Commissioner of the Mexico Section of the International Boundary and Water Commission, we learned that a "water right" to divert water from the Gulf of California would be included with the permission to build all necessary facilities in Mexico. IBWC and CONAGUA would take the lead in obtaining these permissions from various entities within Mexico. As suggested by Mexico IBWC Commissioner Salmon, all necessary actions of various agencies in the United States and Mexico would be identified and scheduled in a new Treaty Minute supporting the Project. The form of this Minute would be developed during the Feasibility Study.

3C LAND USE

Land Use – *Provide project route alignment and status of land use permission for the conveyance route both in the United States and in Mexico.*

Land Use

Land Use Project facilities have been sited, to the extent possible, on lands owned by the governments of the United States and Mexico and on land owned and controlled by the Imperial Irrigation District. However, some lands where facilities would be located, such as on the West Mesa and at the desalination site may be encumbered with private ownership. We do not anticipate encumbering any privately-owned properties in Mexico. Appendices B and C include the detailed route maps and preliminary engineering drawings.



The first step in the land acquisition process would be to seek landowner permission to enter the property for biological, cultural and geotechnical suitability study. Once facility location and alignments are finalized, title searches would be conducted, and purchase and relocation costs would be negotiated. Once the environmental documents have been certified, the Treaty Minute has been completed, and other Presidential Permits or legislative approvals have been obtained making funds available, acquisition of needed lands and rights of way will be completed.

3D ENVIRONMENTAL IMPACT

Environmental Impact – *Provide information on any anticipated environmental impacts from the project in both Mexico and the US and how those will be generally mitigated. This should include a discussion of any anticipated impacts to existing surface water use, groundwater basins, and wildlife resulting from the introduction of ocean water to existing, or new, river channels or canals. If the project is proposed within the Alto Golfo de California Biosphere Reserve, please identify any anticipated impacts to that area and expected mitigation measures.*

Environmental Impact and Mitigation Strategies

It must be emphasized that the entire Project constitutes a comprehensive environmental mitigation solution to the very substantial environmental effects on the Salton Sea, the Pacific Flyway, and the entire Colorado River Basin. As noted above, restoring the Salton Sea to full volume and reduced salinity will provide tremendous environmental benefits ranging from air quality and public health locally and regionally, to high quality habitat for endangered species and the full host of migratory bird species that have come to depend upon this area as a critical link in the Pacific Flyway, a benefit which extends to State, national and international interests. Resolution of the Lower Colorado River Basin structural water supply deficit will also avoid a wide range of environmental impacts that may otherwise be incurred as each of the seven basin states, Indian Tribes, and Mexico independently implement myriad projects to enhance and improve their water supplies, including additional dams and reservoirs, over-pumping of groundwater, and desalination of brackish groundwater. Finally, through mitigation measures to be explored, we believe we can develop opportunities to provide a volume of Gulf-water that can be applied for some level of restoration of the Colorado River delta.

In configuring the Project, care has been taken to avoid, where feasible, sensitive environmental areas. For example, no Indian Reservation lands are used and the U.S. Navy bombing ranges on the West Mesa of Imperial County are avoided. In addition, the water imported from the Gulf will be screened with a 1-mm traveling screen located in the mouth of the tunnel passing under the International Boundary and water in the tunnel will be sterilized with Ozone, thus preventing any biota transfer between the two nations. The entire water conveyance system will be lined preventing seepage that could impact surrounding groundwater basins.

Some sensitive environmental areas could not be avoided. These include, but are not limited to, the canal crossing of the Alto Golfo de California Biosphere Reserve at the north end of the Sea of Cortez, the lining of the East Highline Canal where the existing seepage sustains some valuable habitat as well as the new canal alignment, Re-regulating Reservoir, Penstock and Power Plant on the West Mesa, all of which are in areas populated by the flat-tailed horned lizard. Canal segments in Mexico and the United states will also cross desert tortoise habitat.

On a recent GEI Team visit to the area of the Alto Golfo de California Biosphere Reserve, where the intake canal would be located, it was observed that very little vegetation exists. Therefore, the impact would largely be associated with loss of the 35-mile long, 400-foot wide right-of-way (approximately 1,700 acres) needed for the canal. A likely mitigation strategy would be to purchase additional acreage of concession rights to properties adjacent to the Reserve and add those properties to the Reserve. Another mitigation concept could involve bringing additional Gulf water through the intake canal and using that water to hydrate tributaries that start near Project facilities, including The Old Man River.

In developing the Environmental Review, the GEI team will consult with resource agencies and interest groups in the United States and Mexico to identify procedures to mitigate all significant environmental impacts. Therefore, when the draft Environmental Review is presented for approval it will include strategies to avoid, minimize, or offset all significant environmental impacts, confirming the environmental feasibility of the Project.

Environmental and Related Benefits of the Proposed Plan

The proposed Project described herein is a comprehensive environmental mitigation program that includes: 1) conveyance of ocean water from the Gulf of California north to the Salton Sea for refilling and restoring the Sea, 2) desalination of Salton Sea water to produce fresh water that can be blended for use in the Imperial Irrigation District and Coachella Valley Water District offsetting each district's need to take full delivery of its Colorado River supplies from Lake Mead 3) water can then be made available to other entitlement holders in the Lower Basin States and Mexico (California, Arizona, Nevada, Mexico and the Indian Tribes) Pursuant to Section 202 of P.L. 90-537, the Upper Basin States of Colorado, New Mexico, Utah and Wyoming would also benefit as the delivery obligation at Lee Ferry would be reduced from 8.35 MAF/year to 7.25 MAF/year, thus allowing those Upper Basin States to use more of their Compact entitlement.

Benefits of the Proposed Plan: The proposed Project described herein is a comprehensive environmental mitigation program that includes Salton Sea restoration to conditions approximating

those that existed in the 1960s-1970s, with the Sea sustained at -225 elevation, water quality that can support a thriving population of tilapia, and ocean fish species such as corvina and orange roughly, as well as the endangered pupfish. Conditions at the Sea would be at a premium value for the resident species and migratory birds that have come to rely upon the Sea as a critical segment of the Pacific Flyway, including numerous threatened and endangered species.

The shoreline would be completely submerged, eliminating the pending public health threat posed by an emissive exposed playa. Current odor conditions and frequent mass fish die-offs will be drastically improved or eliminated, and the Sea would be suitable for boating, fishing and related recreational activities. Finally, with the Sea intact, and full entitlements secured for the adjoining agricultural districts, the agriculture to urban water transfers that have been undertaken pursuant to the Quantification Settlement Agreement (QSA) would be secure, ensuring that Southern California's coastal cities have adequate water without placing extra pressure on water supplies from Northern California. Securing the QSA supplies is a critical feature of the proposed Plan, contributing to statewide water supply security.

The comprehensive environmental mitigation program also includes total resolution of the "structural deficit" of water supplies within the Lower Colorado River Basin, ensuring availability of full entitlements and drastically reduced shortage risk to each of the seven basin states, the Indian Tribes, and to Mexico. This includes all of the environmental benefits to the river fisheries, aquatic and riparian habitat, and related recreational uses of the river and its reservoirs. Resolving the structural deficit may also make greater water available for pulse flows that can contribute to restoration of the Colorado River Delta.

Further, under the laws governing allocations of the river between the Upper Basin States (Wyoming, Colorado, Utah and New Mexico) and Lower Basin States, when the Colorado River below Lee's Ferry is augmented by 2.5 million-acre feet per year, the Upper Basin deliveries at Lee's Ferry to satisfy half of the Mexican Treaty obligation under the Colorado River Compact will no longer be required. Accordingly, with implementation of the Project, releases from Lake Powell can be reduced, thus directly benefiting the Upper Basin states in securing their Compact entitlements.

If, and when, higher yields or surplus conditions occur again on the Colorado River, the augmentation program would be reduced. Diversion from the Gulf would be reduced to the quantity needed to maintain the Salton Sea and the desalination system product water would be adjusted accordingly.

Beneficiaries of the Proposed Plan: This comprehensive environmental mitigation program for Salton Sea restoration and full Colorado River augmentation provides benefits to a wide variety of parties and interests directly and indirectly. The full inventory of beneficiaries and expected supporters is extensive, but should include all of the following:

- State of California and Northern Mexico, with significant benefits addressing public health, statewide water security, critical habitat, and environmental quality throughout Southern California.

- All water users that rely in full or in part on the Colorado River, including all of the upper and lower basin states in the U.S., Indian Tribes, and Mexico.
- All involved resource agencies, including but not limited to the California Natural Resources Agency, California Department of Fish and Wildlife, the Imperial Valley Air Quality Management District, Salton Sea Authority, U.S. Bureau of Reclamation, U.S. Fish and Wildlife Service, International Boundary and Water Commission, and others.
- All private environmental advocate interests, including all of the non-governmental organizations that have collectively been working on Salton Sea, Colorado River and Colorado River Delta solutions for decades.
- The Pacific Flyway, a major migratory corridor that extends from Canada through the western United States, to all Central American countries and South America.

There are no parties adversely affected with this comprehensive mitigation plan, and with mitigation for impacts associated with the environmental footprint of the conveyance system, desalination plant, and related electrical power systems, the environmental trade-offs are relatively minimal. This is particularly true when compared to the environmental impacts associated with long-term Salton Sea management plans that do not include restoration of the Sea, or any resolution of Colorado River shortages. The time for comprehensive action is now.

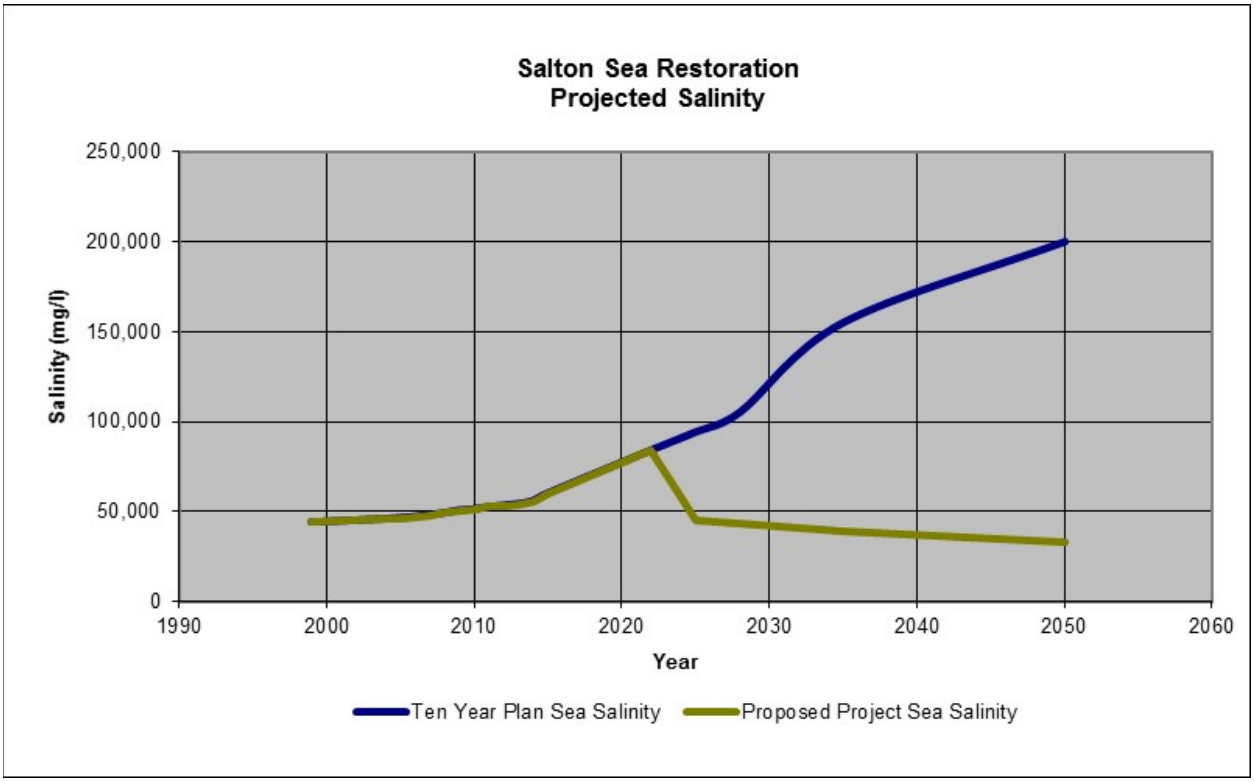
3E SALTON SEA SALINITY, ELEVATION, AND BRINE DISPOSAL

Salton Sea Salinity *– How does the project plan to deal with increased salinity at the Salton Sea from the imported ocean water? If the proposed project includes a desalinization system, where will the resulting brine be deposited?*

Salton Sea Salinity

The dilution effect of the Gulf water would bring the Salton Sea salinity to about 50,000 mg/l by 2025. The Salton Sea salinity would continue to decline over a period of several years to a steady state of about 39,000 mg/l, which is the blend of the salinity of Gulf water and waters from the New, Alamo and Whitewater Rivers.

The salinity of the Salton Sea with and without the Project is displayed in the following graphic.



The elevation of the Salton Sea with and without the Project is displayed in the following graphic.

Brine Disposal: The proposed desalination facility uses a proprietary distillation desalination process that is a zero-liquid-discharge process with the outputs being distilled water, salts and minerals. Therefore, no brine is produced. Through a sequential distillation process, different salts and minerals will precipitate and be removed at different stages, some of which may have commercial value. A three-mile conveyor system will deliver the solid materials to the Union Pacific Railroad Siding near the turnoff to the Niland Marina Road. The Union Pacific Railroad would be contracted with to transport the solid material to markets and disposal sites.

3F WATER USE

Water Use – *Describe the projected water balance including consumptive use, system loss, evaporation etc. and ability of the proposed project to operate successfully with decreased flows.*

Water Use

The Project proposes to divert 2.5 MAF/year from the Gulf of California into the Salton Sea. The water will be used in the following ways:

Water Budget Component	Acre-Feet per Year
Salton Sea	
Delivery from Gulf	2,500,000
Offset Salton Sea Inflow due to QSA	(500,000)
Delivery of Blended Salton Sea and Gulf water to Desalination	2,000,000
Desalination Facility	
Delivery of Blended Salton Sea and Gulf water to Desalination	2,000,000
Delivery to IID/CVWD canals for exchange in Lake Mead	(1,800,000)
Commercial delivery of water to Mexico	(100,000)
Losses and brine disposal	(100,000)
Net	0
Colorado Aqueduct	
Offset Salton Sea Inflow due to QSA	500,000
Delivery to IID/CVWD canals for exchange in Lake Mead	1,800,000
Net	2,300,000

There will be miscellaneous losses and seepage from various facilities when in actual operation.

During the feasibility study, the extent of miscellaneous losses/seepage will be quantified, and a detailed water budget will be developed.

3G CROSS BORDER GOVERNMENTAL COORDINATION

Cross Border Governmental Coordination and Permitting *– Provide details of conducted or needed coordination and permitting from governmental agencies from both Mexico and the United States that deal specifically with cross border project development. Agencies include but are not limited to the International Boundary Water, Commission, Mexico federal agencies, tribal governments, and necessary United States agencies.*

Cross Border Governmental Coordination and Permitting

Over the past three years members of the GEI team have briefed representatives of various governmental agencies on various aspects of the project.

Key briefings have been with:

- February 14, 2018 – Briefing in Ontario, California for Colorado River Board of California
- February 9, 2018 – Briefing in Palm Springs, California for Urban Water Institute
- February 7, 2018 – Briefing in Mexicali for Commissioner Salmon (Mexico) & Commissioner Drucina (U.S.) and their staffs of IBWC
- December 15, 2017 – Briefing in Las Vegas, Nevada for Michael Cohen of Pacific Institute
- December 14, 2017 – Briefing in Las Vegas, Nevada for Bureau of Reclamation; Commissioner Brenda Burman and Lower Colorado Regional Director Terry Fulp
- December 14-15, 2017 – Informal Briefing in Las Vegas, Nevada for Commissioner Salmon (Mexico) and Commissioner Drucina (U.S.) and their staffs of IBWC
- Various Dates in 2015, 2016, and 2017 – Briefings for IID (Board Presentation on October 3, 2017), Members of Imperial County Board of Commissioners, Assistant Secretary Wilcox and others

The purpose of these briefings has been to make the agencies and individuals aware of the proposed project and seek guidance regarding needed changes and additions/deletions to the Project Plan. Valuable insights were received, and many changes were incorporated into the Project plan. No endorsements were sought or received, but importantly, no party on either side of the border rejected the proposed plan or indicated unwillingness to pursue it through the feasibility study.

3H PROJECT DEVELOPMENT SCHEDULE

Project Development Schedule – *Schedule for project development from current stages through implementation.*

Project Development

A detailed schedule of major activities is provided in **Appendix C.** Key activities and completion dates are as follows:

Activity	Completion Date
Phase 1 Activities:	
• Submittal of proposals	03/09/2018
• Selection of winning proposal	06/01/2018
• Award of feasibility study/implementation contract	07/01/2018
• Enactment of State funding authorization	12/30/2018
• Completion of 24-month feasibility study & ER	06/30/2020
• Concurrent 20-month design and specifications – Phase 1	06/30/2020
• Complete required approvals and award of construction contracts	09/01/2020
• Phase 1 Construction Completion and Start-up	09/01/2022
• Complete Salton Sea Re-fill	09/01/2025
Phase 2 Activities:	
• Design calibration for distillation facility	08/01/2018 to 12/30/2018
• Passage of Federal legislation	12/30/2019
• Availability of Federal Appropriations	10/01/2020
• Complete designs of Phase 2 facilities	12/01/2022
• Completion/start-up of Phase 2 facilities	12/31/2025
• Colorado River augmentation of 1.8 MAF	Calendar year 2026

4 COST PROJECTIONS

Cost Projection – *Provide a cost projection for the proposed project. The projection should be documented to the extent that the reviewers can review the cost projection process and determine the validity of the projections.*

Cost Projection

Appendix D includes pre-feasibility engineering cost estimates for all project facilities, prepared using topographic maps and other available electronic media. The estimates include appropriate allowances for unlisted items and contingencies, conforming to industry cost-estimating standards.

- ***Phase 1*** facilities are expected to have a capital cost of about $2 billion and an OM&R cost of about $8 million per year.
- ***Phase 2*** facilities are expected to have a capital cost of about $1 billion and an OM&R cost of about $42 million per year.

Facility layouts, designs and cost estimates have been developed using the judgment of professionals having many decades of experience with similar large-scale water conveyance and desalination projects. During the proposed feasibility study, alternative locations and sizing of facilities will be considered to determine the most cost-effective and environmentally benign project plan that can then be implemented.

5 PLAN FOR FUNDING OF PROPOSED PROJECT

Plan for Funding of Proposed Project – *Describe how the planning, design and construction implementation of the project will be funded. Identify the responsible parties for the operation and maintenance for the project and estimate annual cost.*

Plan for Funding of Proposed Project

Phase 1 – Construction of Phase 1 facilities is expected to cost about $2-billion dollars. Based upon the QSA legislation enacted by the State of California in 2003, it is assumed that the capital cost of

constructing Phase 1 facilities will be borne by the State of California. Some funding is already available for implementing the Ten-Year Plan and other funds are anticipated from a proposed bond issue that will be considered by the electorate later this year. It is recommended that a part of these available funds be used to fund the cost of the proposed feasibility study and environmental Review.

On a long-term basis, however, reliance upon the State legislature to provide State approval of the Project and make available funding through the annual appropriation process would not provide the assurance needed by contractors to complete the Phase 1 work on a timely basis. The urgency of the potential regional health crisis and impending Colorado River shortages will not wait for the potential delays caused by a start and stop funding process. Accordingly, it is proposed that the State of California authorize the Project and enact a "Continuing Appropriation" of $3 billion for implementation of Phase 1 and for pre-construction activities on Phase 2.

Phase 1 OM&R Costs – As the operator of Project facilities constructed in the United States, the IID will receive the peaking power developed by the hydro-plant where 2.5 MAF/year of Gulf water is dropped about 225 feet into the Salton Sea. The value of this power ($10 million per year) should equal or exceed the OM&R cost of facilities in the United States and Mexico. To fund OM&R costs of facilities in Mexico, a form of agreement between IID and the appropriate agency in Mexico (likely CONAGUA) would be developed during the feasibility study

Phase 2 – Construction of Phase 1 facilities is expected to cost about $1 billion. As previously mentioned, the Colorado River Basin Project Act (P. L. 90-537) at Section 202 declared

> *"that the satisfaction of the requirements of the Mexican Water Treaty from the Colorado River constitutes a national obligation"*

Furthermore, Section 204 of P. l. 90-537 states:

> *"SEC. 204. There are hereby authorized to be appropriated such sums as are required to carry out the purposes of this title."*

Accordingly, the cost of implementing Phase 2 should be borne by the Federal Government.

Therefore, it is recommended that the State of California, with the GEI Team, approach the Secretary of the Interior with a request that:

1. Funding be included in the President's FY 2020 budget for implementation of Phase 2 facilities; and
2. The Secretary, with the assistance of the Bureau of Reclamation, submits a report to the Congress describing the proposed augmentation project and seeking congressional authorization of said plan.

When Federal funding becomes available, any Phase 2 costs previously advanced by the State of California should be returned to the State.

APPENDIX A – KEY STAFF RESUMES

Marc Rozman, P.E.
Vice President, Program Manager

resume

Marc Rozman is a registered civil engineer with almost three decades of experience in water, wastewater, reclaimed water, and drainage facility design and construction. Areas of expertise include hydraulic analyses, civil/site engineering, and the design/construction of pipelines (including force mains, trunk and interceptor sewers, and transmission mains), pumping stations (lift stations and booster pumping stations), and treatment facilities (water treatment plants, and secondary and tertiary wastewater treatment plants).

RELEVANT PROJECT EXPERIENCE

East Porterville Water Supply, California Department of Water Resources, Porterville, CA. Project manager of the design team and engineer-of-record for the water pipeline design and appurtenant structures for the Phase 1 work. The work consisted of expanding the City of Porterville's East Porterville Booster Pump Station (adding vertical pump, motor, VFD, piping, valves and appurtenances, electrical, and controls), constructing 12 miles of potable water pipelines (8-inches to 18-inches), connecting 320 water services and restoring road pavement sections. Oversaw the team that reviewed site conditions; collected utility data; coordinated utility investigation work; participated in stakeholder document review meetings; prepared calculations, drawings, specification, cost estimates; reviewed calculations, drawings, specifications, cost estimates; responded to RFI's; reviewed submittals; prepared record drawings. The project was brought from conception to final design in less than five months and the construction was completed in less than eleven months from the commencement of planning and design.

Bear River Setback Levee, Three Rivers Levee Improvement Authority, Yuba City, CA. Project manager overseeing the construction management team. The project primarily consisted of over 9000 feet of slurry wall installation to a depth up to 70 feet deep. The foundation for the future 30 foot high levee embankment was also constructed. Additional project components included: irrigation pipeline relocations, site drainage management, relief well installation and well abandonment. The contract was awarded in September, 2005 and the slurry wall had to be completed by the end of October of the same year. The Contractor worked double shifts during the week and single shifts on Saturday and Sunday to meet the schedule requirements. Oversaw inspection of all the Contractor's activities, including the slurry wall and foundation work to assure that the work was completed as required. Also oversaw the construction management of the Contractor's activities and administered the contract requirements. The future levee foundation work was added as a contract change order to facilitate the future levee construction.

EDUCATION
B.S. Civil Engineering, Oregon State University

EXPERIENCE IN THE INDUSTRY
33 years

EXPERIENCE WITH GEI
14 years

REGISTRATIONS AND LICENSES
Professional Engineer, CA No. 42862

GEI Consultants

Diligently monitored and documented the Contractor's activities for this work and then was the primary negotiator for the final change order amount.

Antelope Valley Groundwater Banking Program, Semitropic-Rosamond Water Bank Authority, Antelope Valley, CA. Project manager and engineer of record for the design and construction management of the AVWB Initial Recharge and Recovery Facility Improvement Project. A total of $5M in grant funds were secured from the Bureau of Reclamation (2009 American Recovery and Reinvestment Act) for the development of the AVWB project. Total Project costs were $10.8M which included construction of project elements that will deliver water for recharge and recovery into local and regional conveyances using existing and new recovery wells. Facilities developed under this contract included 160 acres of recharge basins, four fully equipped recovery wells, 1.5 miles of 54-inch diameter steel pipe for the main transmission line, 1.75 miles of well discharge pipeline that varies from 18 inches to 48 inches, and a tie-in connection, with a magnetic flow meter and flow control valve, to the Antelope Valley East Kern Water Agency (AVEK) 60-inch West Feeder Pipeline. Also oversaw the design of a turnout with a capacity of 350 cfs off of the California State Aqueduct.

Baseline Feeder Extension South Pipeline, San Bernardino Valley Municipal Water District, San Bernardino, CA. Project manager and engineer of record for the design and construction management of the 78-inch diameter welded steel transmission pipeline. The pipeline will ultimately be an integral component of the District's master planned facilities. The City of San Bernardino uses the pipeline for transmission to their distribution system. Western Municipal Water District may utilize a portion of the pipeline capacity for conveyance to their Riverside-Corona Feeder, a planned major transmission pipeline. The project included: roughly 25,000 feet of pipeline, two major creek crossing (one lined and the other unlined), major street crossings, large utility and substructure crossings, right-of-way acquisition, and a railroad crossing. The pipeline's regional use and application mandates close coordination of participating agencies-namely the City of Riverside, the City of San Bernardino and Western Municipal Water District. Due to each of these agencies varied intended use consensus building is a critical project element.

Forrest Frick Pumping Plant Electrical Upgrades, Arvin Edison Water Storage District, Arvin, CA. Project manager for the engineering, inspection and construction management for the multiple phased project to modernize the nearly 50-year old pumping station with new electrical equipment and provided existing building upgrade recommendations and design documents to meet current building code requirements (seismic upgrades). The initial phase replaced the old main 115 kV oil-filled circuit breaker with a dead-tank, three-pole SF6 filled outdoor power circuit breaker with three SF6 interrupters. The initial project also included installation of a new 125 VDC battery system. The second phase provided the replacement of the two existing transformers with two new 12.5/15MVA liquid filled substation type transformers, including load tap changers (LTC). The work also included furnishing, testing, delivering, and installing new 5kV Switchgear, 5kV Starters, 115kV Relay Control Panel, PLC Panel, Distribution Panelboards, Power Panelboards, DC Panelboard, DC Battery Charger, Control Building lighting, and all wires and cables.

Mid-Valley Pipeline and Pump Station, Coachella Valley Water District, Coachella, CA. Construction manager for the construction of more than 16,500 linear feet of 4-inch thick concrete lining of the Calloway Canal, a trenchless railroad crossing consisting of double barrel 120-inch reinforced concrete pipe and the turnin/turnout connection of the Calloway Canal to the Cross Valley Canal. The facilities have a capacity of greater than 400 CFS. The work was completed utilizing three separate construction contracts. The CVC to Calloway connection and a short interconnecting canal segment were completed in 2013. The railroad crossing was completed in 2014 and the last canal lining contract was completed in 2015. The last concrete lining contract lined more than 12,000 linear feet of canal and included connection to the existing overcrossing of the Calloway Canal over the Friant-Kern Canal.

Mark S. Williamson, P.E.
Vice President, Principal Engineer

resume

Mark Williamson is a registered civil engineer with 36 years of experience in both the public and private sectors. He has provided civil engineering expertise in numerous aspects of water resources, including hydroelectric, water supply, design, construction management, water distribution system modeling, dam safety, surface and groundwater hydrology, flood control, and project management.

EDUCATION
M.S. Civil Engineering, University of Washington
B.S. Civil Engineering, University of California, Berkeley

EXPERIENCE IN THE INDUSTRY
38 years

EXPERIENCE WITH GEI
12 years

REGISTRATIONS AND LICENSES
Professional Engineer, CA No. C035671

PROJECT EXPERIENCE

Water Management Planning
Significant experience managing water supply studies and water source investigations. Client services provided include technical and policy assistance in water supply reliability, conjunctive use and groundwater banking, reservoir system analysis, and regulatory compliance.

- Led the development of an Integrated Regional Water Management Plan for the Eastern San Joaquin Groundwater Basin Authority in 2007, and is the project manager the 2014 IRWMP Update.
- Performed surface and groundwater hydrologic balance of Salton Sea, California, in support of litigation.
- Project manager for completion of the Imperial Integrated Regional Water Management Project.
- Project manager for Coachella Valley Water District Wastewater Master Plan
- Served as the project manager for development and environmental screening of a range of implementable supply and groundwater recharge options for use of San Joaquin County water rights filings as part of the Freeport Element of the American River Utilization Project.
- Managed the Mojave Water Agency's 2005 Regional Water Management Plan Update, a stakeholder-driven process to screen and select the best water management strategy to match projected supplies with forecasted 2020 demands. The Plan was developed to meet the requirements of an Integrated Regional Water Management Plan, a Groundwater Management Plan, and a Regional Urban Water Management Plan. This effort included development of a Programmatic Environmental Impact Report.
- Developed recommendations on long-term water acquisition options for Mojave Water Agency and facilitated a 14,000 acre-foot transfer to the agency.
- Developed groundwater storage and conjunctive use projects to meet projected demands. Project Manager on the San Joaquin County/EBMUD Mokelumne Aquifer Recharge and Storage Project.
- Performed EIR/EIS review of 130,000 acre-foot Pamo Dam and Reservoir for the City of San Diego to determine feasibility of supplying emergency supply to San Diego County.

Hydraulic/Water Supply Studies:

- Project Manager for assessment of four competing desalination projects in the Monterey Bay area.
- Principal for development of EBMUD's Water Supply Management Program Environmental Impact Report, an alternatives evaluation and integrated resources plan.
- Performed assessment of yield of American and Sacramento rivers to EBMUD using the Bureau of Reclamation's PROSIM model of the Central Valley Project and State Water Project.
- Project Engineer for the Mountain Tunnel Flow Study for the City of San Francisco's Hetch Hetchy Water and Power Department. The project involved the testing and modeling of this 20-mile tunnel to determine the reasons for decreasing flow capacity, and recommending and implementing remedial measures.
- Project Manager for the Balboa and Francisco Reservoirs Needs Assessment for the San Francisco Water Department. Future water demand estimates were updated and incorporated into KYPIPES and LIQSS (Stoner) distribution system models for pressure zones serving 80 percent of the City. Using these models, areas of deficient pressure or storage were identified and solutions formulated using both remedial piping or the presently unused Balboa and Francisco Reservoir sites.
- Project Manager for engineering alternatives analysis for replacement of Hetch Hetchy Reservoir.

Water Resource Development Projects

Responsible for negotiation and development of surface water and groundwater development projects, including groundwater recharge/banking projects and major surface water diversion and conveyance projects.

- Directed technical studies and developed agreements for joint development of the Freeport Water Supply Project by EBMUD and Sacramento County Water Agency. Directed technical studies and developed agreements for joint development of the Freeport Water Supply Project by EBMUD and Sacramento County Water Agency, including participation in Water Forum fisheries management planning.
- Performed environmental analysis of groundwater recharge options for Joshua Basin Water District.
- Performed analysis of local groundwater banking projects for the Kern County Water Agency.
- Performed Indian Public Trust (Winters) water rights quantification, groundwater depletion studies, flooding studies, surface and groundwater hydrology, irrigation and drainage system design, well design, and utility rate studies.

Design

- Design Engineer for the North Stockton Water Pipeline, a nine-mile, 48-inch diameter transmission pipeline for the City of Stockton. Included design of 42- and 30-inch distribution mains. Project included preparation of plans, specifications, cost estimates and bid documents, and acquisition of permits, easements and agreements from more than 20 agencies and utilities. $8 million construction cost.
- Design Engineer for upgrade and 8 MGD expansion of two 20 MGD, 400-foot lift pump stations on the Whale Rock Water Conduit, San Luis Obispo County.
- Design of Farmington Canal Siphons, three twin bore eight-foot diameter inverted siphons approximately 500, 550 and 1300 feet long, together with intake and discharge structures and related facilities for the Stockton East Water District.
- Oversight for design and construction of groundwater recharge, recovery, and conveyance facilities in San Joaquin County and within the East Bay Plain, California.
- Preliminary design of stream diversion, intake, and pumping facilities for the Coastal Streams Project, San Luis Obispo County.
- Preliminary design of spillway modifications for Salinas Dam, San Luis Obispo County.
- Preliminary design of pipeline and pumping facilities to serve emergency storage reservoirs in San Diego County.

MIKE CLINTON, PE

Michael J. Clinton is the President of Michael Clinton Consulting, L.L.C., a sole proprietorship in Las Vegas, Nevada, where he provides consulting engineering services to clients throughout the southwest. Throughout his entire career, beginning with being a surveyor and inspector during construction of Glen Canyon Dam, its power plant and transmission system, Mike has specialized in the operation of the River, management of its water quality and determination of entitlements to the waters of the Colorado River.

Previously, he served as General Manager of the Imperial Irrigation District, California, where he was responsible for managing one of the largest irrigation districts in the United States and the sixth largest electric utility in the State of California. He oversaw a staff of over 1,000 employees and an annual budget exceeding $300 million.

From 1987 to 1995, Mike was Senior Vice President of Bookman-Edmonston Engineering in Glendale, California. In that position, he developed and oversaw processing of authorizing legislation, permitting and implementation of client projects throughout the western States.

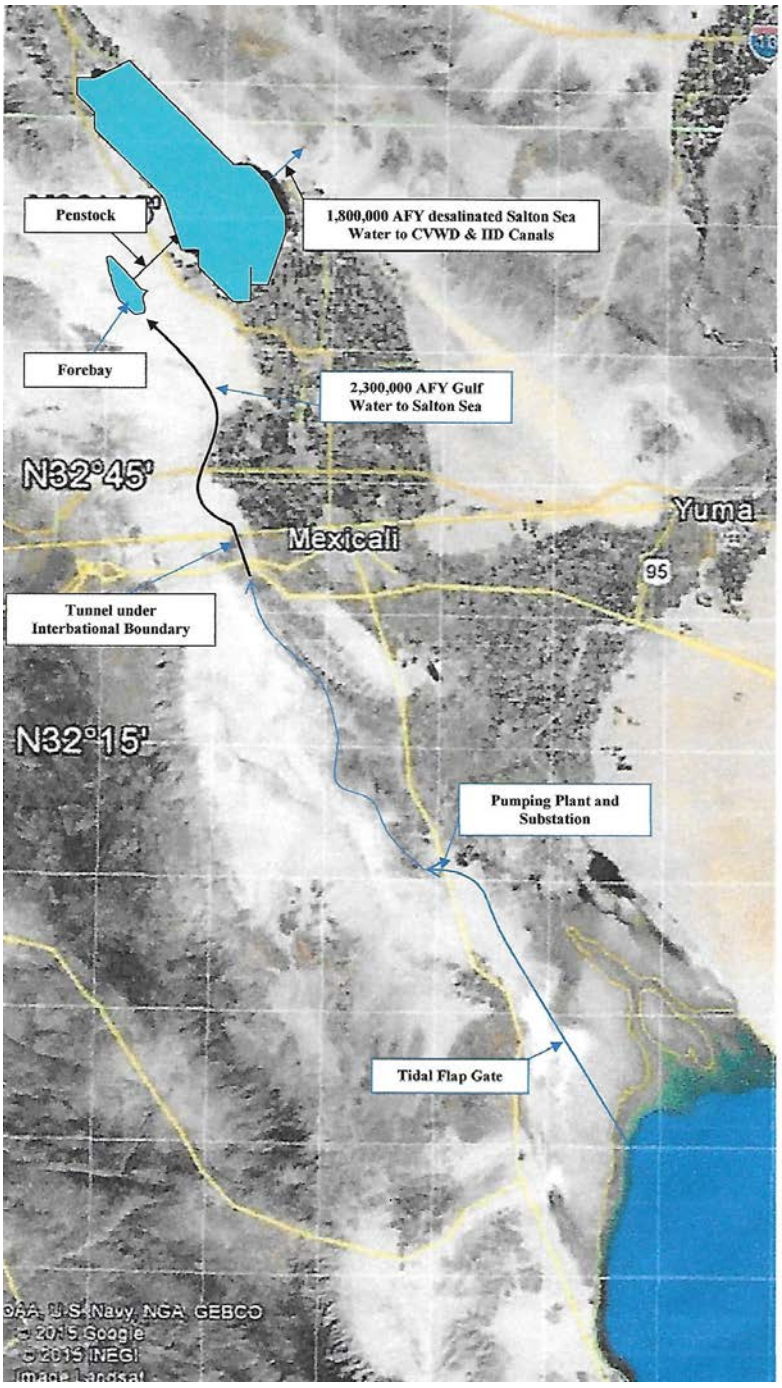
From 1961 to 1987, Mike was with the United States Department of the Interior – Bureau of Reclamation and Geological Survey.

- 1961 to 1964 – Construction inspector and surveyor during construction of Glen Canyon Dam, Power Plant and Transmission Line Systems;
- 1965 to 1966 – Hydrologic Technician measuring and evaluating stream flow data for the Utah District, USGS;
- 1967 – 1979 – Civil Engineering Technician and Civil Engineer in Reclamation's Salt Lake City, Boulder City and Washington DC Offices; During the 1971 through 1974 period, Mike was Reclamations representative dealing with the International Boundary and Water Commission regarding measures to manage the salinity of Colorado River waters going to Mexico (Helped manage and develop Minutes 218, 241 & 242);
- 1979 to 1984 – Manager of the Federal/State Colorado River Water Quality Improvement Program – Oversaw the implementation of the injection well brine disposal strategy for the Paradox Unit, completion of Meeker Dome Unit and construction of Grand Valley Unit; and,
- 1984 to 1987 – Special Assistant to the Under Secretary of the Department of the Interior – Provided trouble shooting, policy formation and technical guidance for the Office of the Secretary.

Mike holds a B.S. Degree in Civil Engineering from the University of Utah; is a Graduate of the Federal Executive Institute in Charlottesville, VA; is a Fellow and Life Member of the American Society of Civil Engineers and is licensed to practice as a Civil Engineer in Arizona, California, Colorado, Nevada, Utah, Texas, Wyoming and other Western States.

APPENDIX B – ENGINEERING DRAWINGS

APPENDIX B

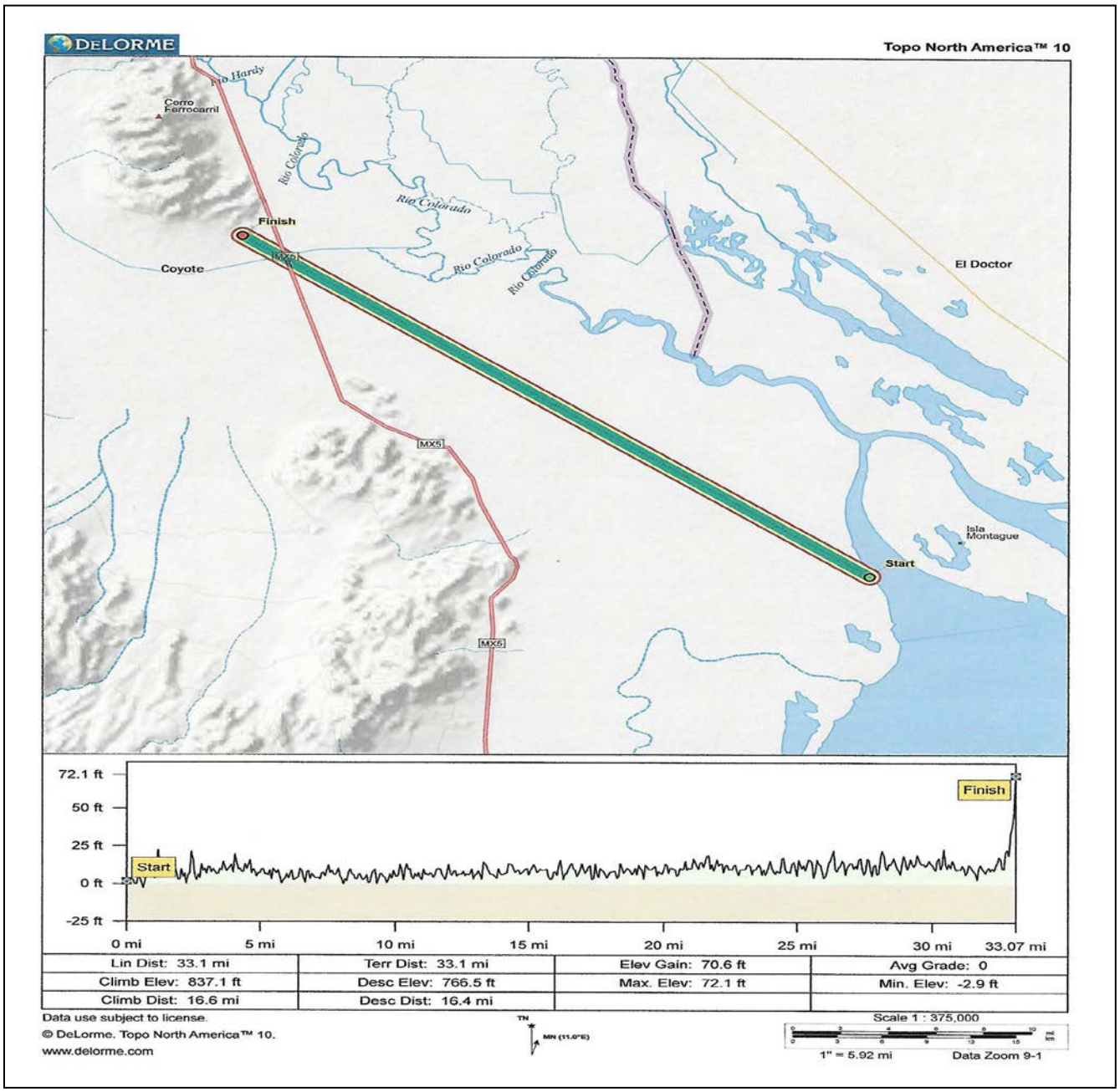


Bi-National Canal for Salton Sea Restoration and Colorado River Augmentation

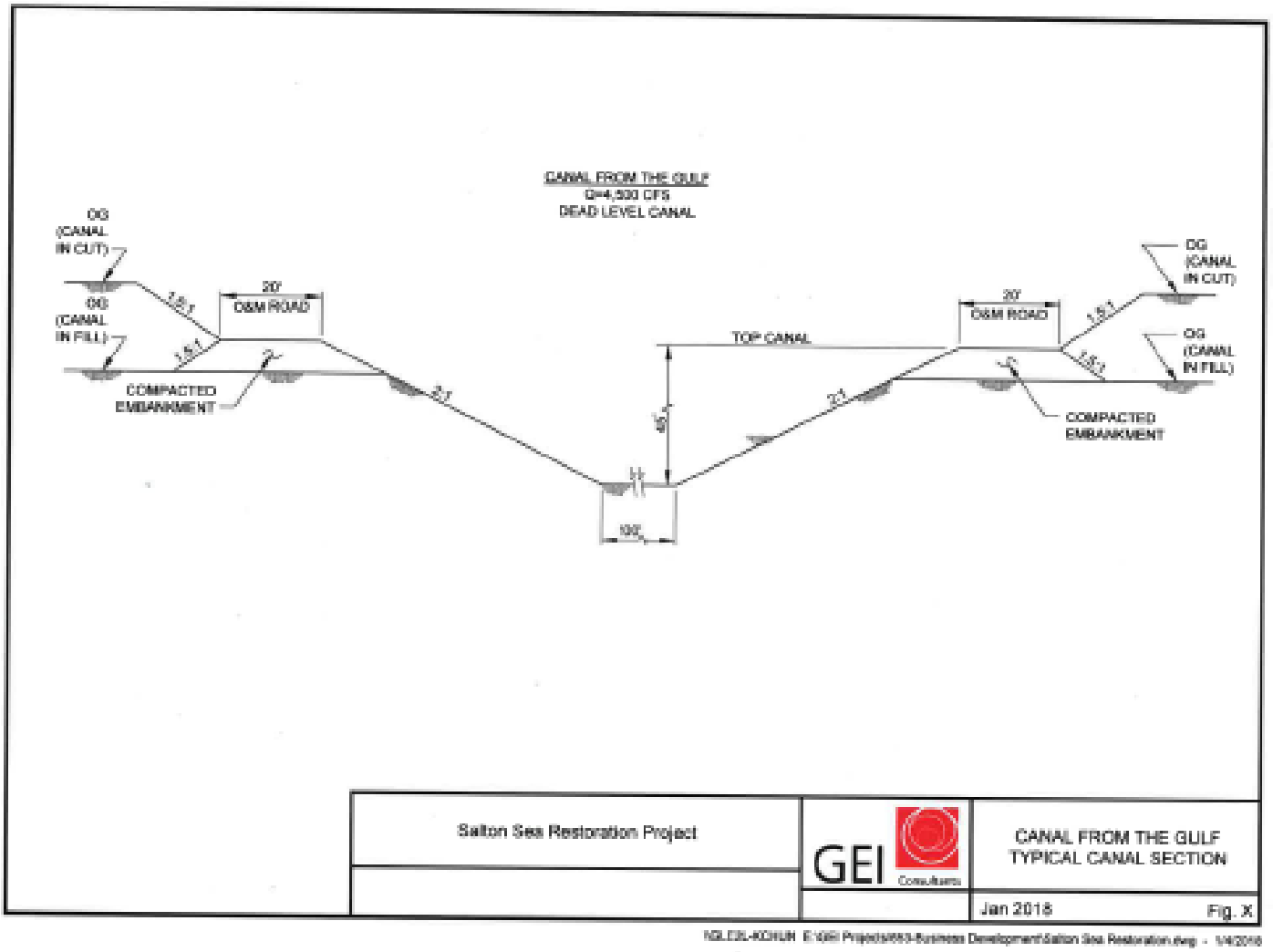
Proposal to the California Natural Resources Agency in Response to December 8, 2017 Request for Information for Salton Sea Water Importation Projects

Submitted by:
GEI Consultants, Inc.
and Michael Clinton Consulting, LLC

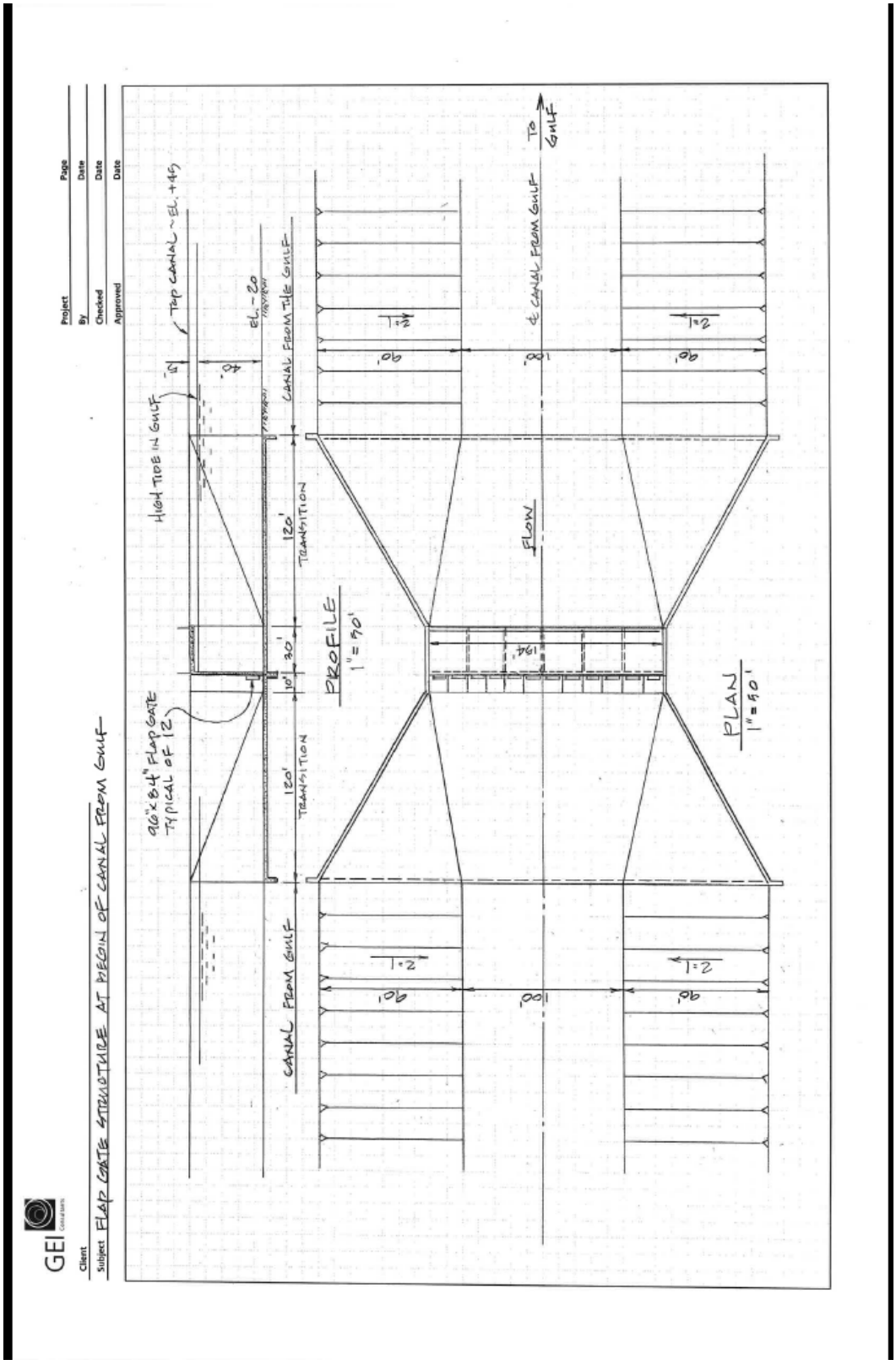
March 9, 2018

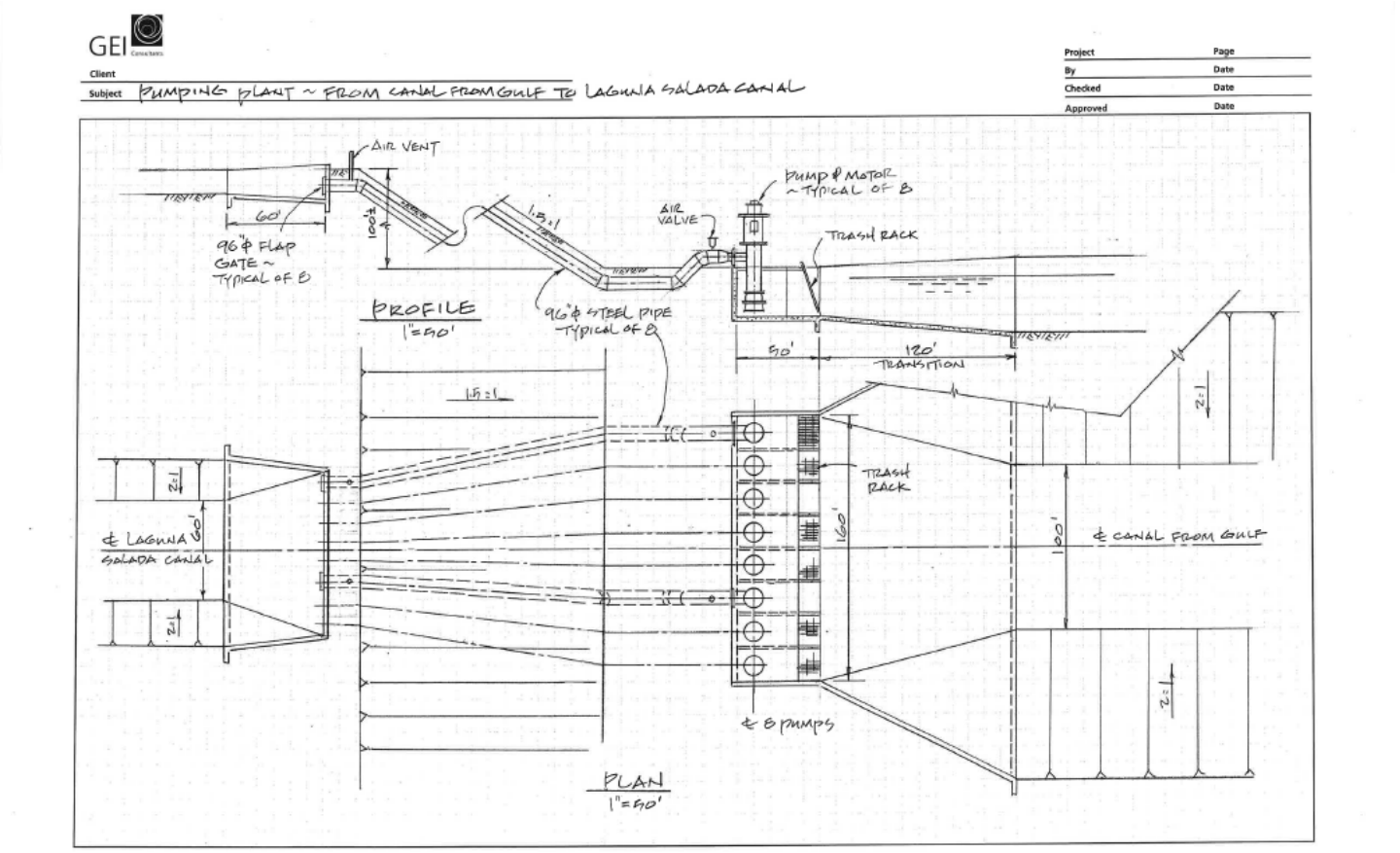


Canal from the Gulf - A 4,500 cfs dead level canal would be built from the gulf to the southeast side of the Laguna Salada near the Mexicali/San Felipe Highway and would be filled twice daily with water from the Gulf at high tide.

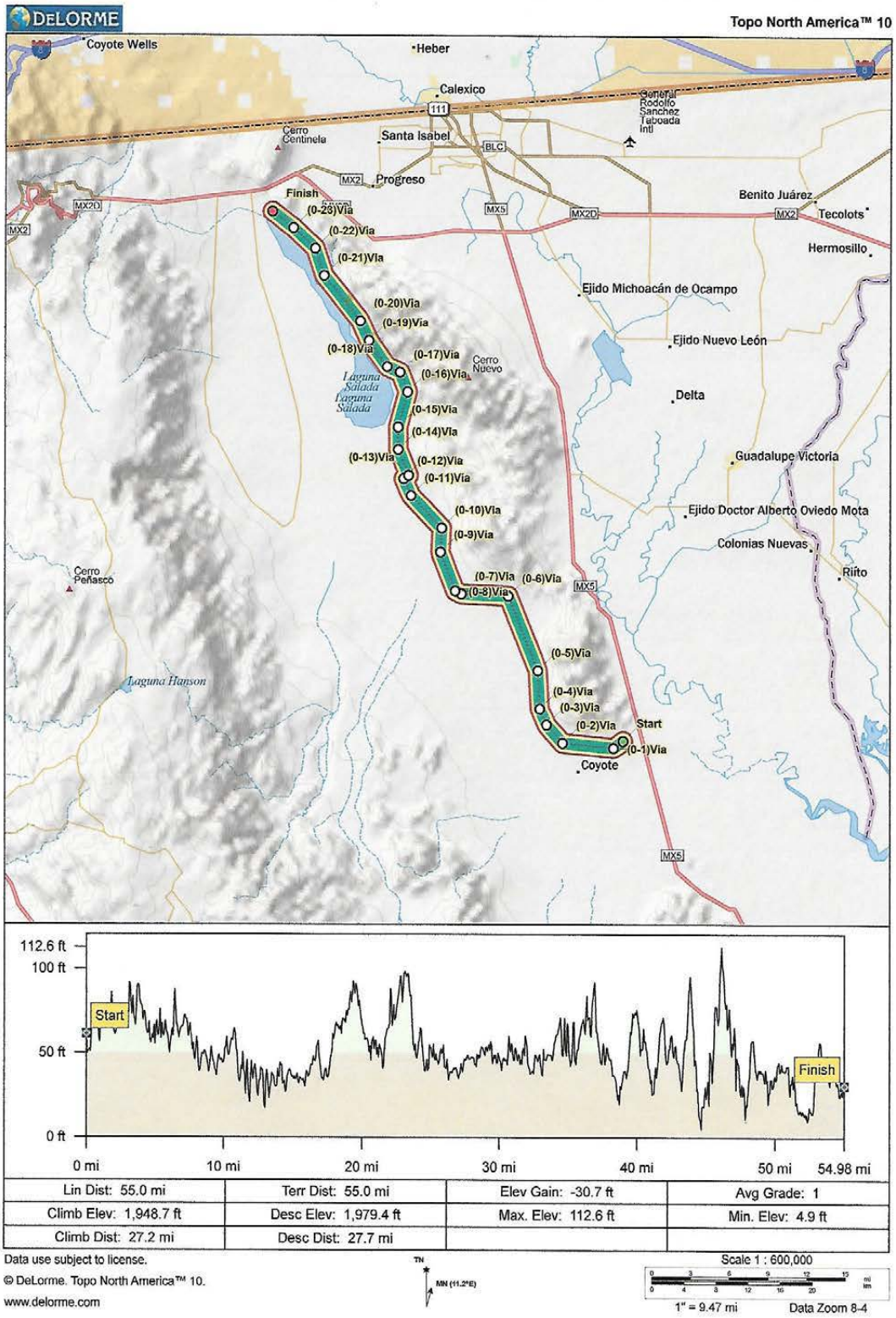

CANAL FROM THE GULF
Q=4,500 CFS
DEAD LEVEL CANAL
OG (CANAL IN CUT)
OG (CANAL IN FILL)
20' O&M ROAD
1.5:1
1.5:1
2:1
COMPACTED EMBANKMENT
TOP CANAL
45'
130'
2:1
20' O&M ROAD
1.5:1
1.5:1
OG (CANAL IN CUT)
OG (CANAL IN FILL)
COMPACTED EMBANKMENT
Salton Sea Restoration Project
GEI Consultants
CANAL FROM THE GULF
TYPICAL CANAL SECTION
Jan 2018
Fig. X

Canal From Gulf – Flap Gate Structure

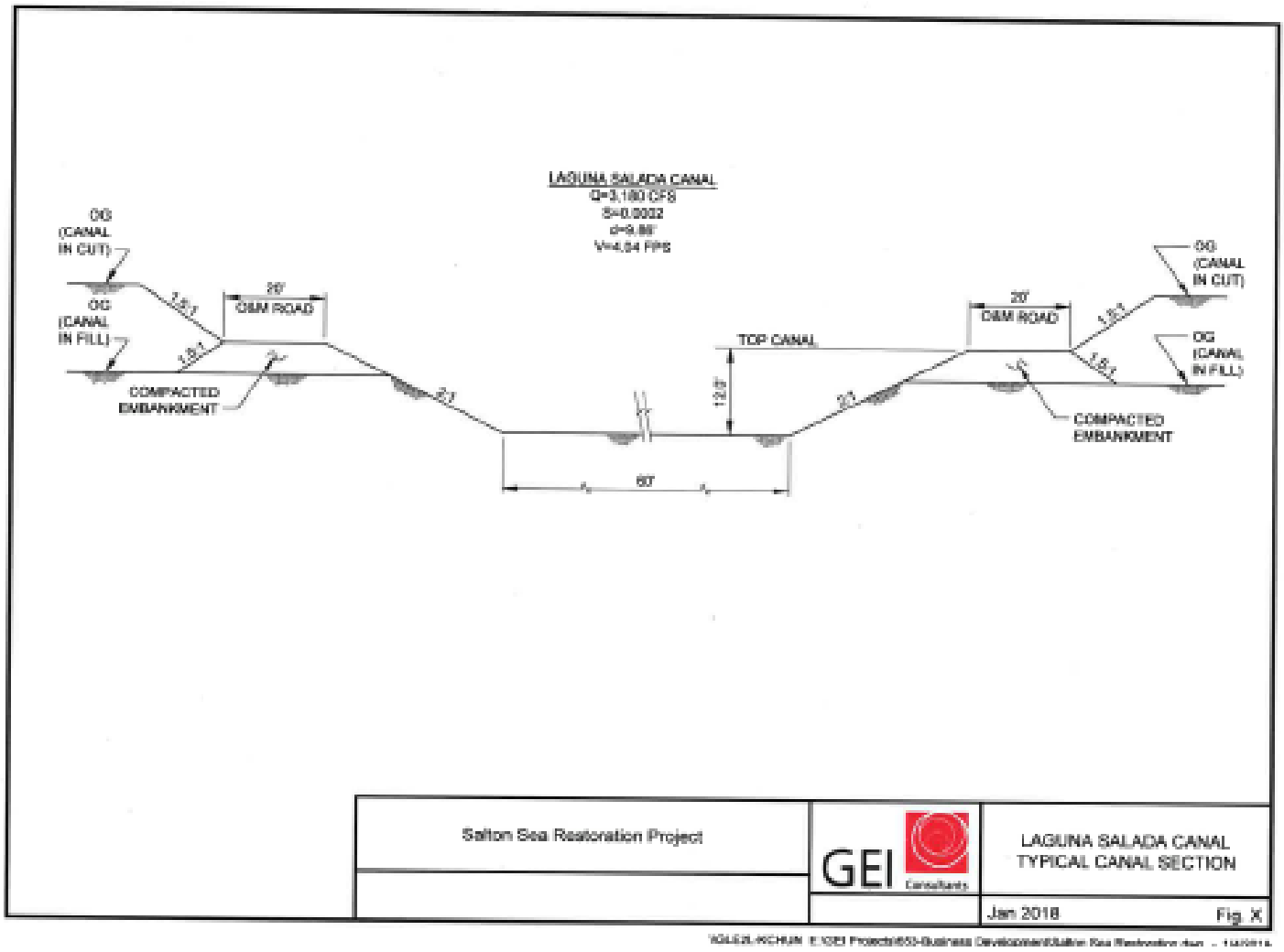


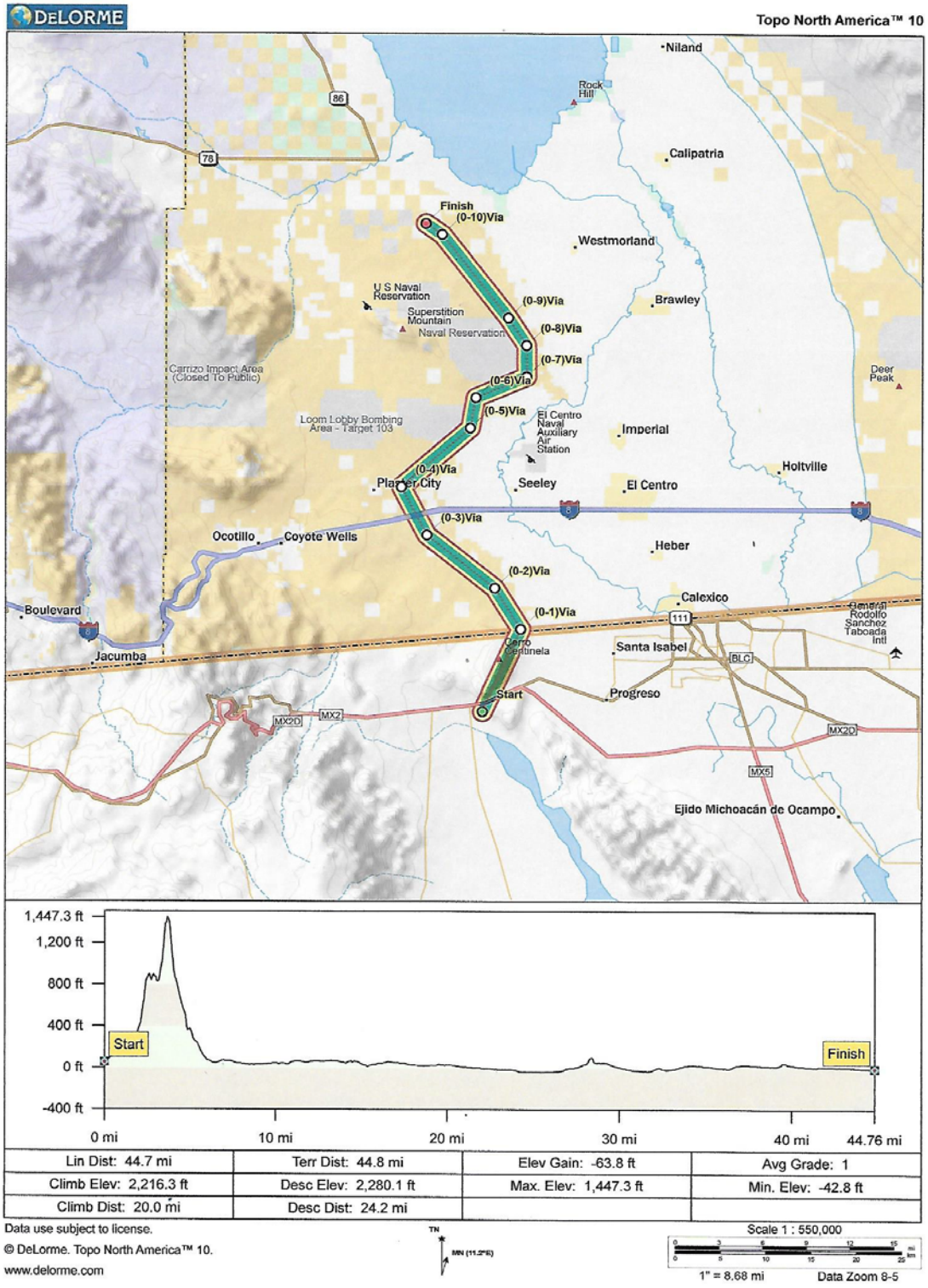


San Felipe Highway Pumping Plant – At the end of the canal from the Gulf, a pumping plant would lift the water about 95 feet to the heading of the Laguna Salada Canal. Since no power lines are in the area, we would locate an array of solar panels along the west bank of the Laguna Salada Canal and use a commercial storage battery to store daytime energy for nighttime use.



Laguna Salada Canal – The 3,200 cfs Laguna Salada Canal would begin at the outlet of the Mexicali/San Felipe Highway Pumping Plant and would have a gradient of about one foot per mile and follow contours on the east side of the Laguna Salada, bringing water near the International Boundary at an elevation of about 50 feet above mean sea level.

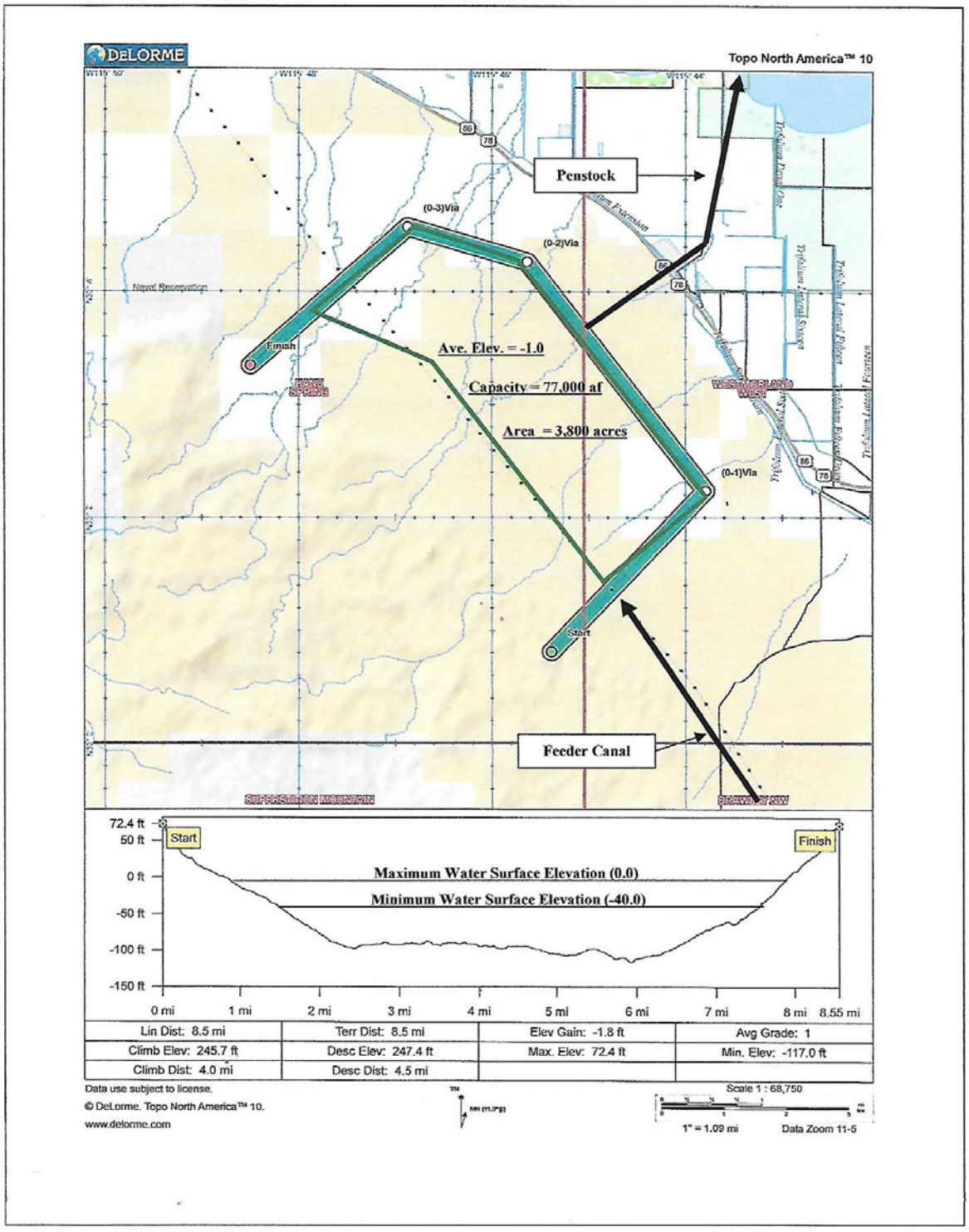

LAGUNA SALADA CANAL
Q=3,180 CFS
S=0.0032
d=9.86'
V=4.84 FPS
OG (CANAL IN CUT)
OG (CANAL IN FILL)
1.5:1
20'
O&M ROAD
1.5:1
COMPACTED EMBANKMENT
2:1
TOP CANAL
12.5'
2:1
60'
20'
O&M ROAD
1.5:1
OG (CANAL IN CUT)
OG (CANAL IN FILL)
1.5:1
COMPACTED EMBANKMENT
Salton Sea Restoration Project
GEI Consultants
LAGUNA SALADA CANAL
TYPICAL CANAL SECTION
Jan 2018
Fig X



Tunnel, Environmental Protections and Feeder Canal – A four-mile long tunnel carries the water under the International Boundary. At the heading of the tunnel, at about 50 feet above mean sea level, a one mm screen will prevent fish and most gulf biota from leaving Mexico through the tunnel. Inside the tunnel, the Gulf water will be sterilized using either UV lights or Ozone.

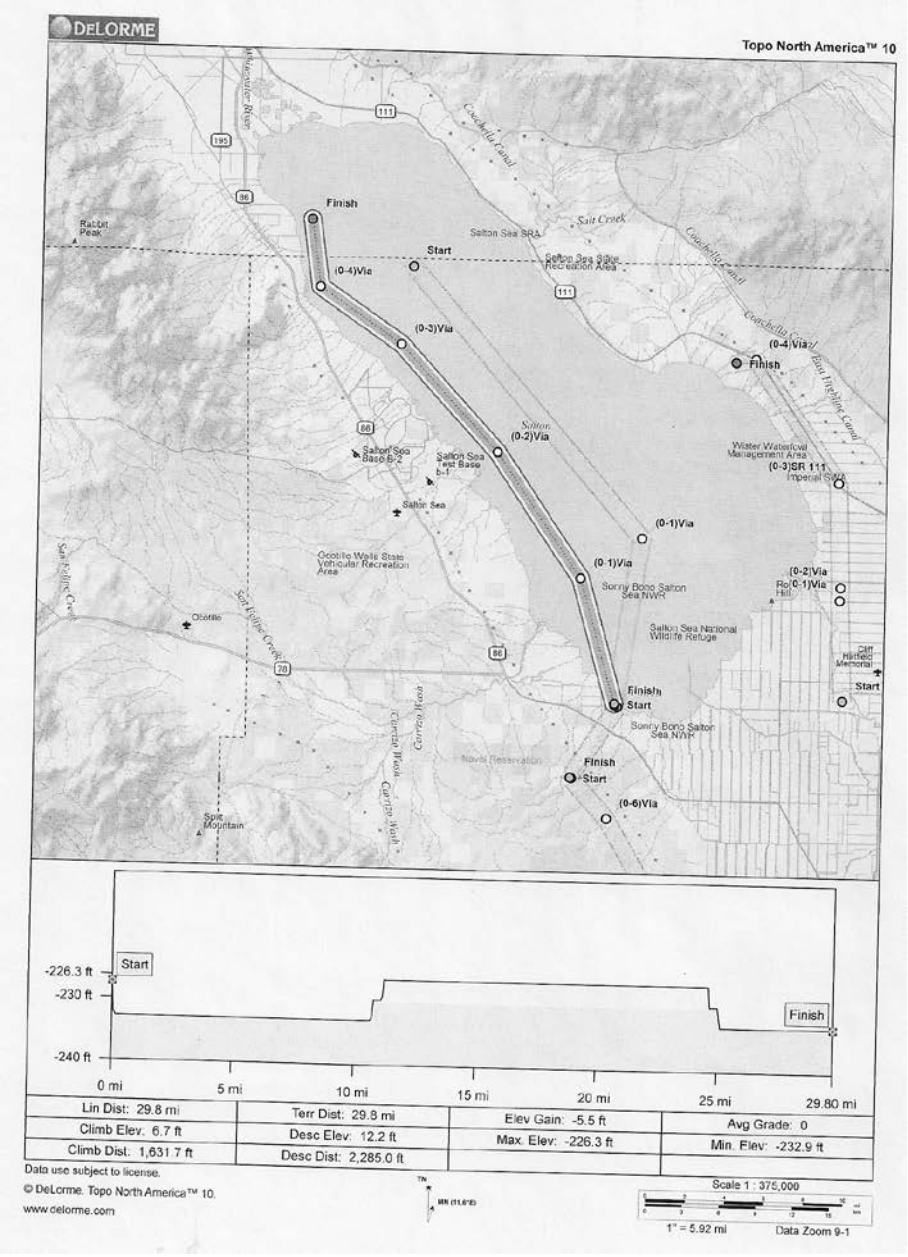
Figure 5

West Mesa Dam and Reservoir



West Mesa Dam, Forebay, Penstock and Power Plant – A 30-foot high dam and forebay reservoir would be constructed about 15 miles west of Westmoreland. Gulf water will fill this reservoir in a continuous steady flow. The Penstock will carry 5,500 cfs to the power plant which will operate about 5,000 hours per year, on peak, generating about 40 MW (dispatchable), supplementing renewables.

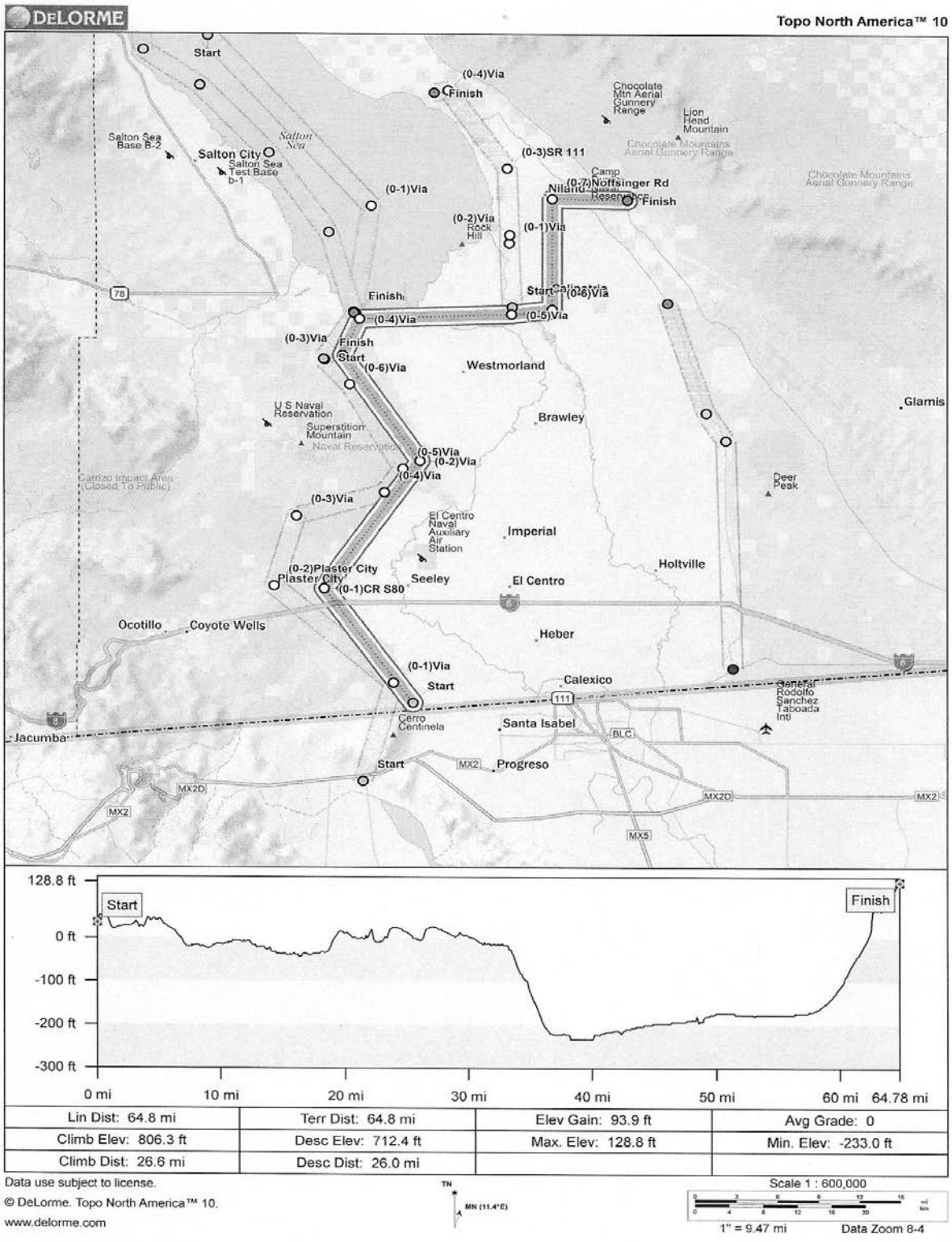
Sheet Pile Discharge Training Wall



Sheet Pile Discharge Training Wall - To avoid upsetting the limnology of the Sea the power-plant discharge will be dispersed along the west side of the Sea using a sheet pile training structure driven into the bed of the Sea.

Top elevation of sheet pile will be at -225' elevation.

Every 1,000 feet, a section of sheet pile will be driven to an elevation of -230-foot elevation to provide an outlet to the Sea. In operation, flash boards would be used to partially close these openings so Gulf water enters the Salton Sea gradually along the entire length of the structure.

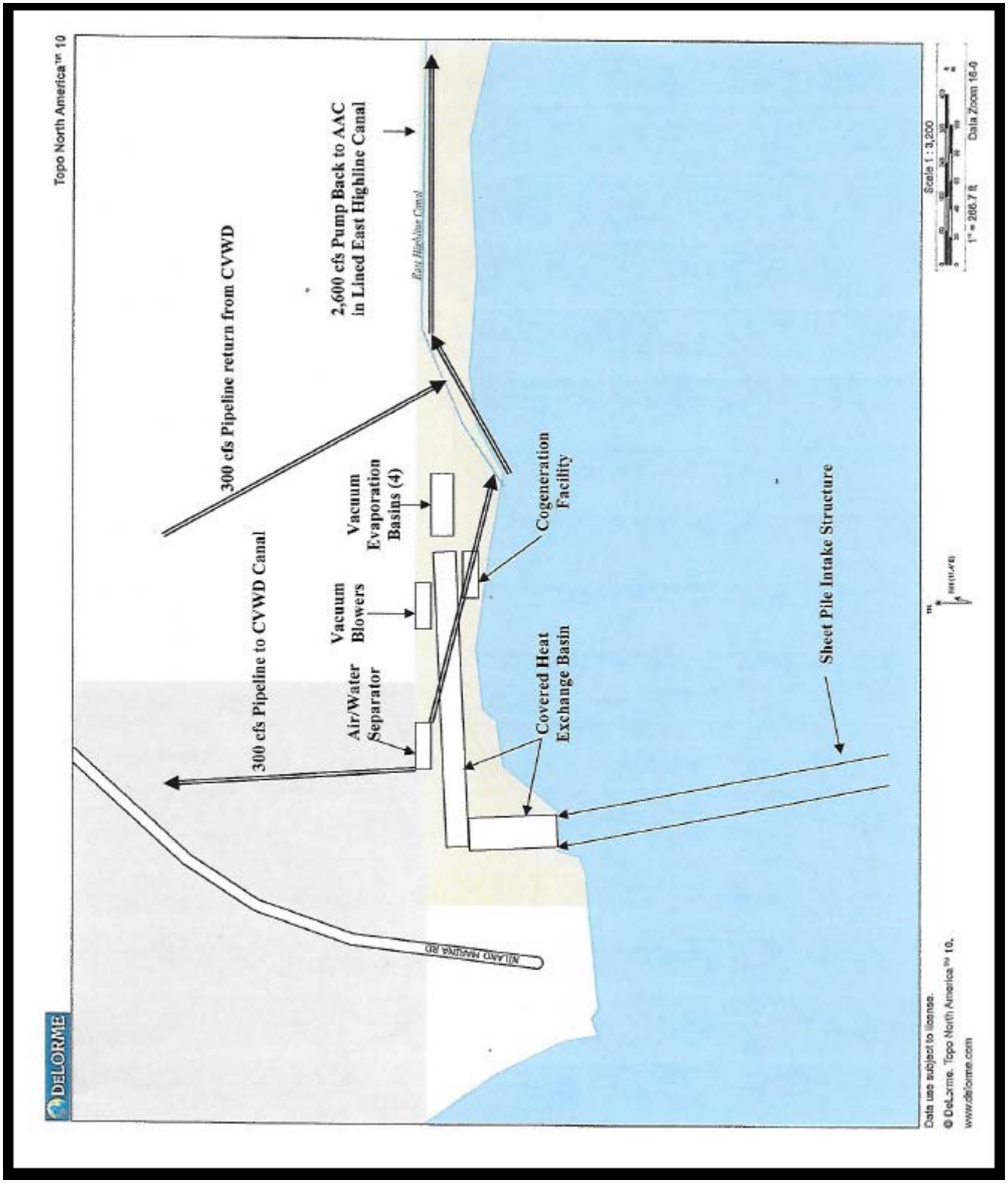


Power Transmission System – To connect the peaking power plant to the regional power grid, a 230 kV transmission line would be constructed from the SDG&E Imperial Valley substation to a new 230 kV substation at the hydro power peaking facility, continuing on to the IID Midway substation.

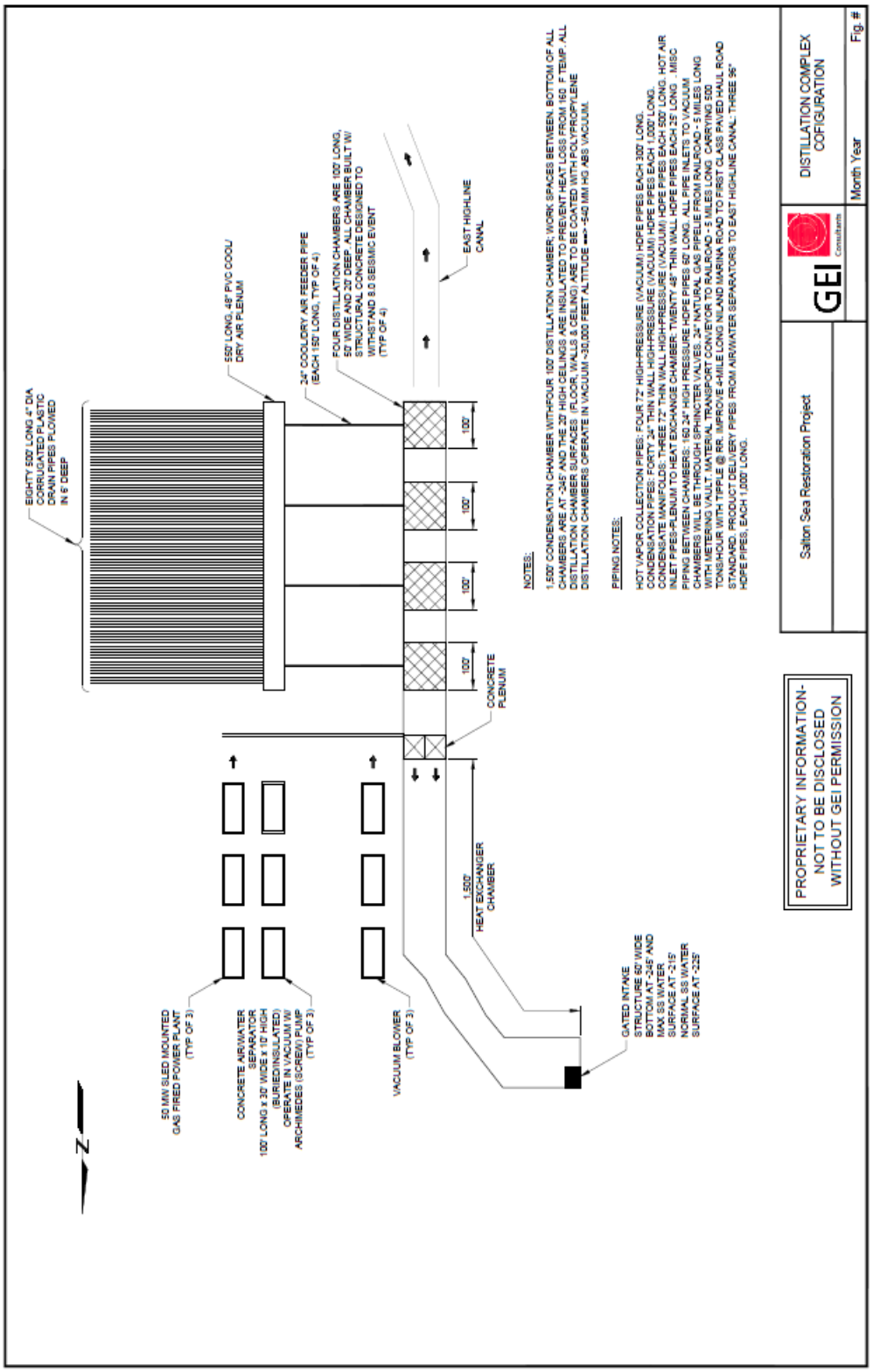
Water Supply – The canal delivery system is designed to carry **2.3 to 2.5 MAF/year** of Gulf water into the Salton Sea for the following purposes:

- To offset the **500,000 AFY** being withheld from the Salton Sea under the QSA;
- To allow about 1.8 MAF/year of 60,000 PPM salinity Salton Sea water to be removed from the Sea to offset the tonnage of salt brought in from the Gulf plus the tonnage of salt contributed annually by the New, Alamo and Whitewater Rivers, thus maintaining salt balance in the Sea; and,
- For desalination of **1.8 MAF/YEAR that** would **offset** the **Lower Basin structural water supply deficit**.

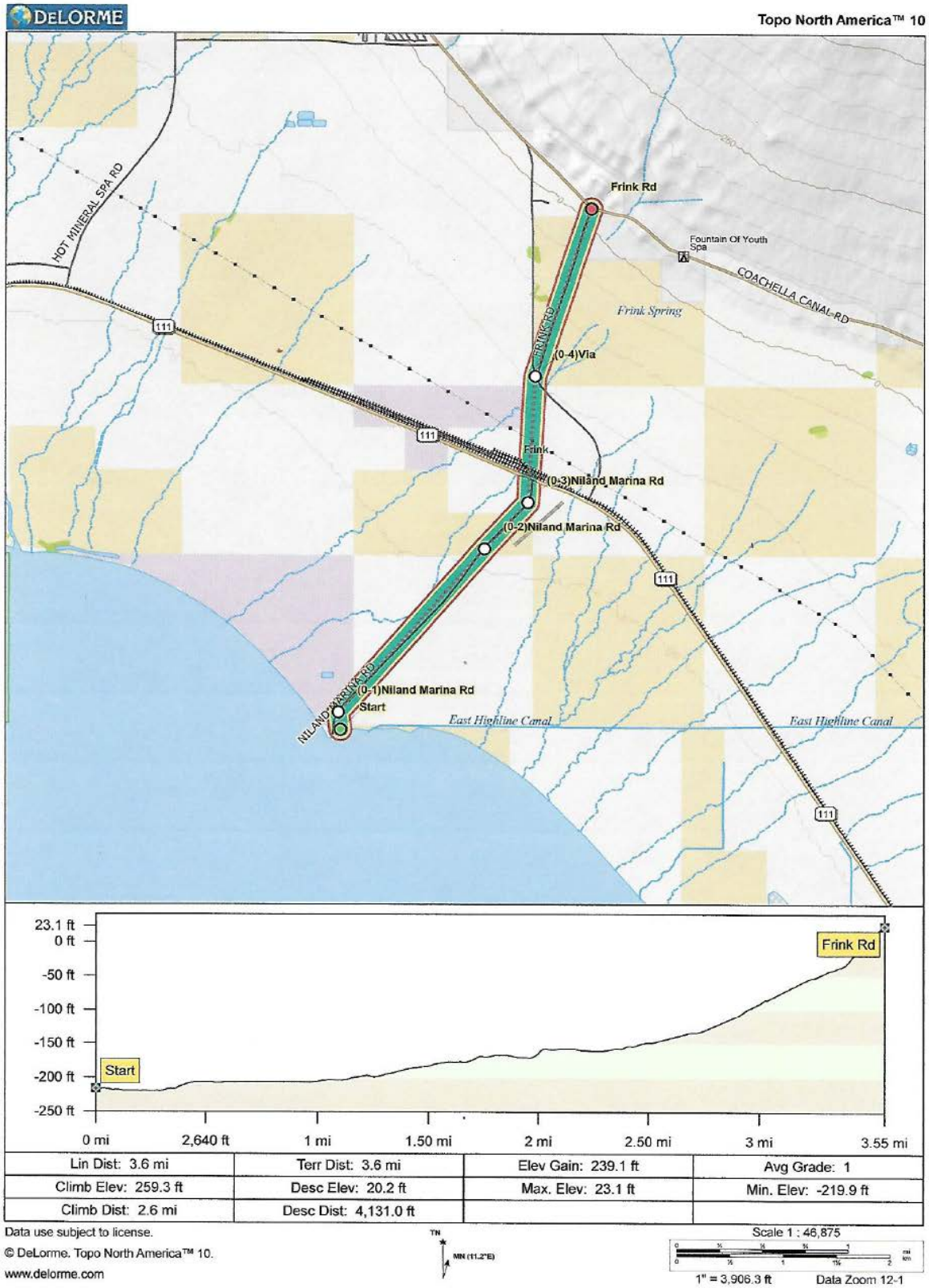
Desalination Complex Layout



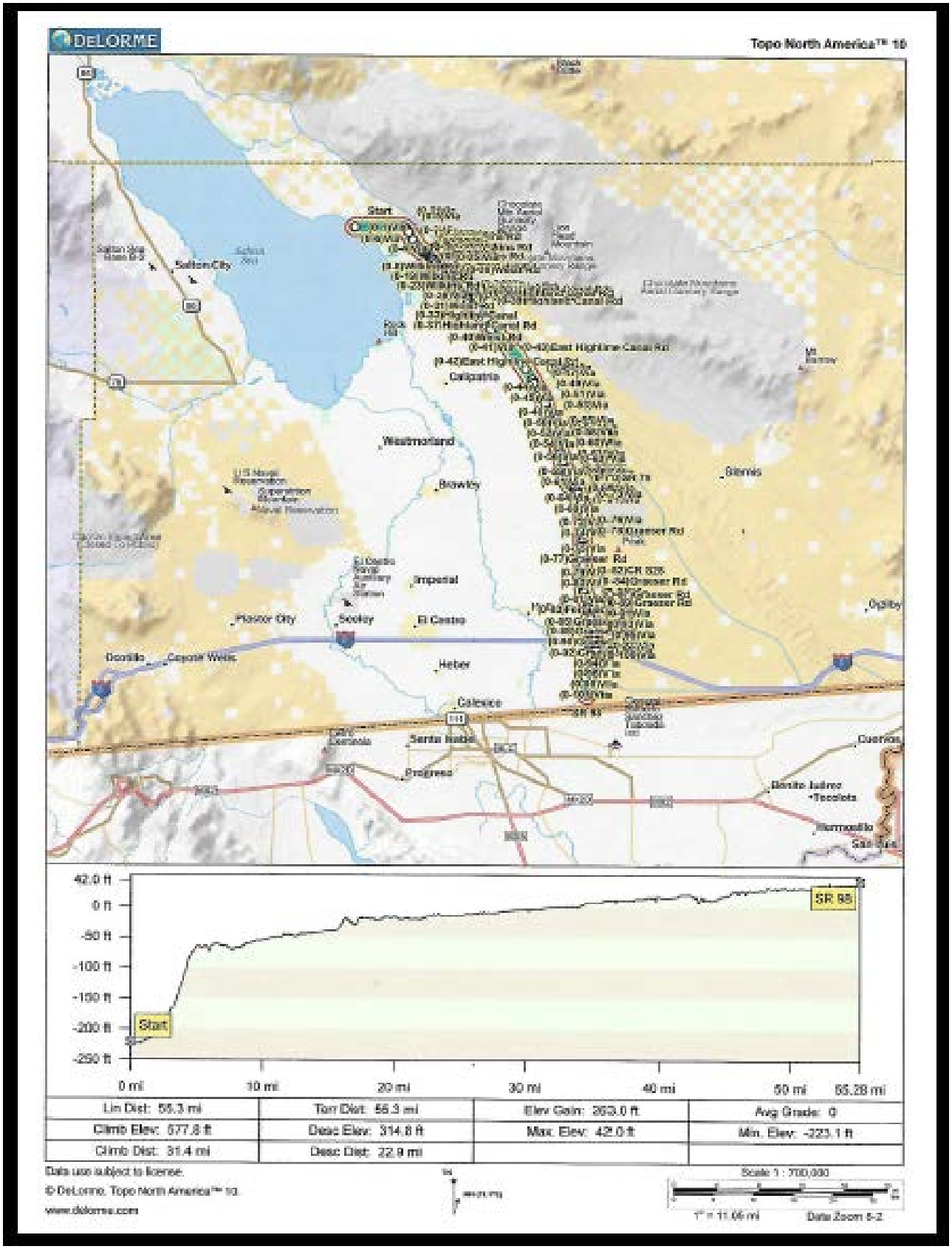
Desalination Complex Design - Proprietary



Coachella Canal Exchange Pipelines – Plan and Profile

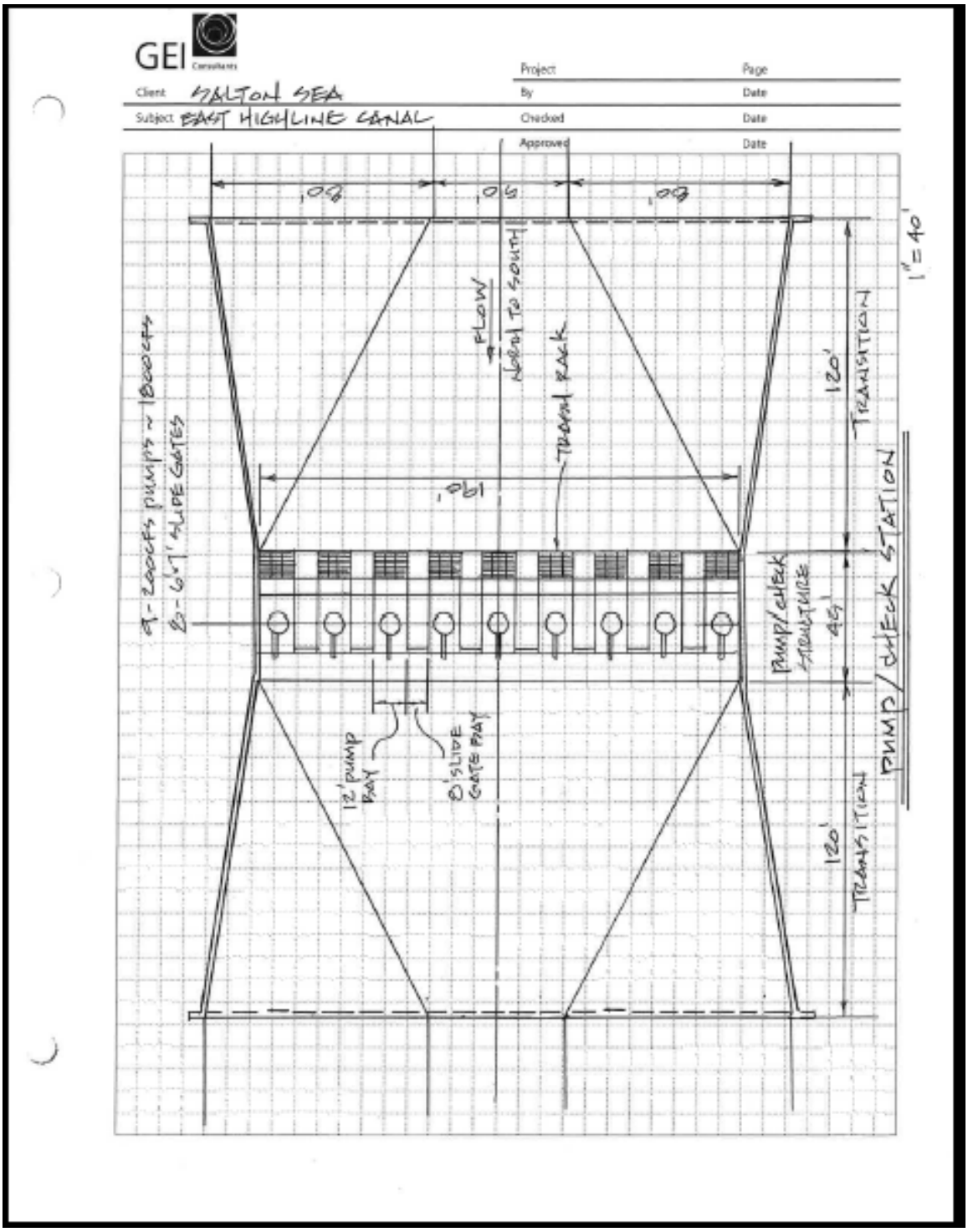


East Highline Canal Pumpback – Plan and Profile



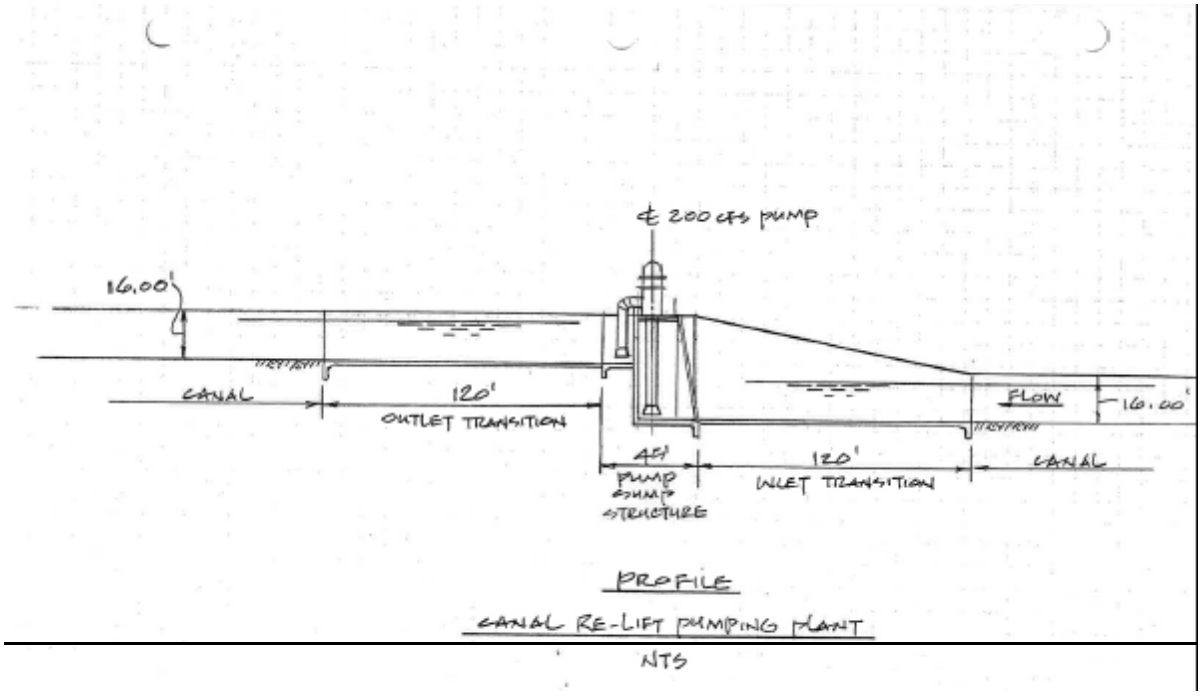
East Highkine Canal Pumpback – Check/Pumpback Structure

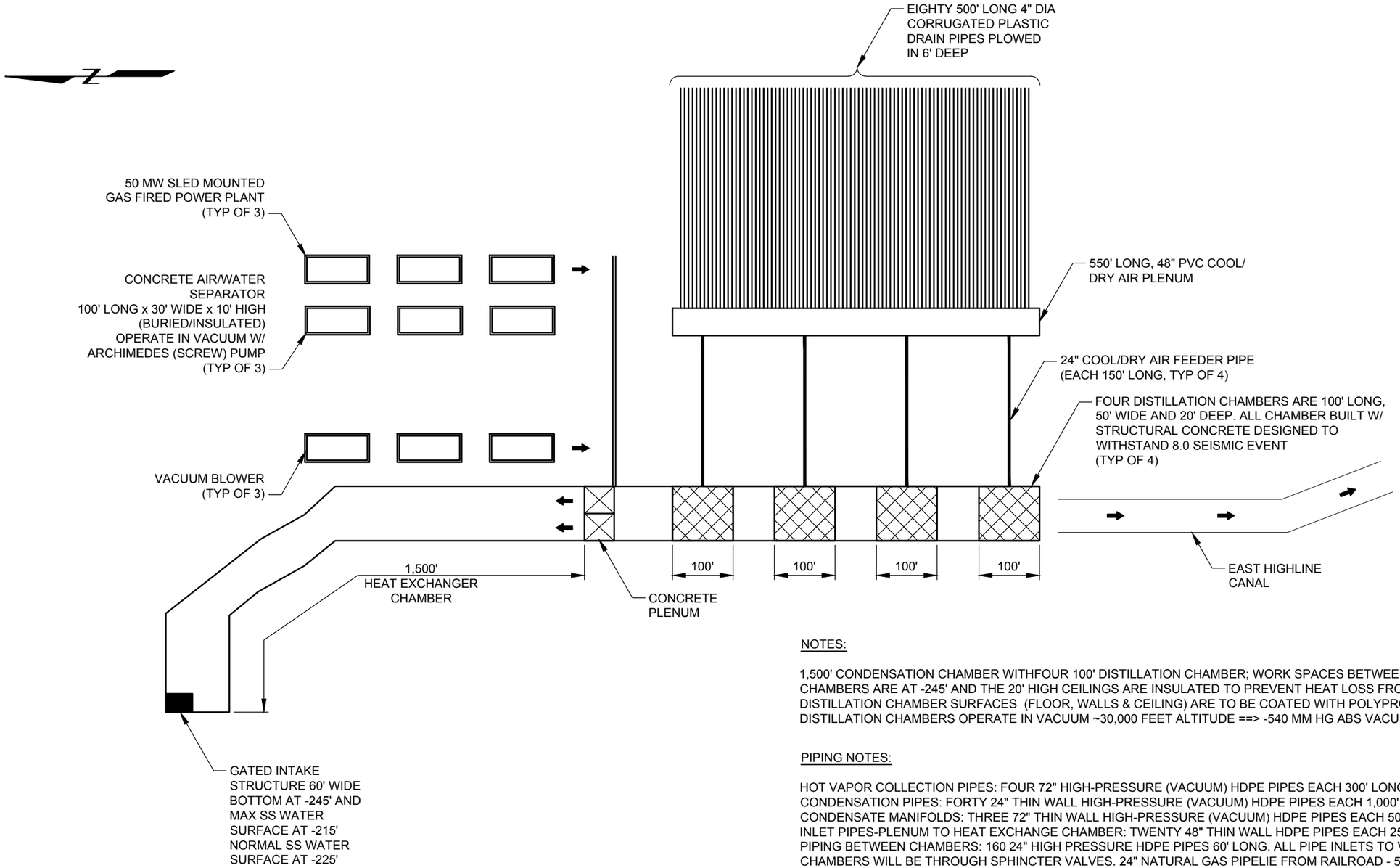
Plan View (Typical)



East Highkine Canal Pumpback – Check/Pumpback Structure

Profile View





NOTES:

1,500' CONDENSATION CHAMBER WITHFOUR 100' DISTILLATION CHAMBER; WORK SPACES BETWEEN. BOTTOM OF ALL CHAMBERS ARE AT -245' AND THE 20' HIGH CEILINGS ARE INSULATED TO PREVENT HEAT LOSS FROM 160 F TEMP. ALL DISTILLATION CHAMBER SURFACES (FLOOR, WALLS & CEILING) ARE TO BE COATED WITH POLYPROPYLENE DISTILLATION CHAMBERS OPERATE IN VACUUM ~30,000 FEET ALTITUDE ==> -540 MM HG ABS VACUUM.

PIPING NOTES:

HOT VAPOR COLLECTION PIPES: FOUR 72" HIGH-PRESSURE (VACUUM) HDPE PIPES EACH 300' LONG. CONDENSATION PIPES: FORTY 24" THIN WALL HIGH-PRESSURE (VACUUM) HDPE PIPES EACH 1,000' LONG. CONDENSATE MANIFOLDS: THREE 72" THIN WALL HIGH-PRESSURE (VACUUM) HDPE PIPES EACH 500' LONG. HOT AIR INLET PIPES-PLENUM TO HEAT EXCHANGE CHAMBER: TWENTY 48" THIN WALL HDPE PIPES EACH 25' LONG . MISC PIPING BETWEEN CHAMBERS: 160 24" HIGH PRESSURE HDPE PIPES 60' LONG. ALL PIPE INLETS TO VACUUM CHAMBERS WILL BE THROUGH SPHINCTER VALVES. 24" NATURAL GAS PIPELIE FROM RAILROAD - 5 MILES LONG WITH METERING VAULT. MATERIAL TRANSPORT CONVEYOR TO RAILROAD - 5 MILES LONG CARRYING 500 TONS/HOUR WITH TIPPLE @ RR. IMPROVE 4-MILE LONG NILAND MARINA ROAD TO FIRST CLASS PAVED HAUL ROAD STANDARD. PRODUCT DELIVERY PIPES FROM AIR/WATER SEPARATORS TO EAST HIGHLINE CANAL: THREE 96" HDPE PIPES, EACH 1,000' LONG.

Salton Sea Restoration Project

GEI Consultants

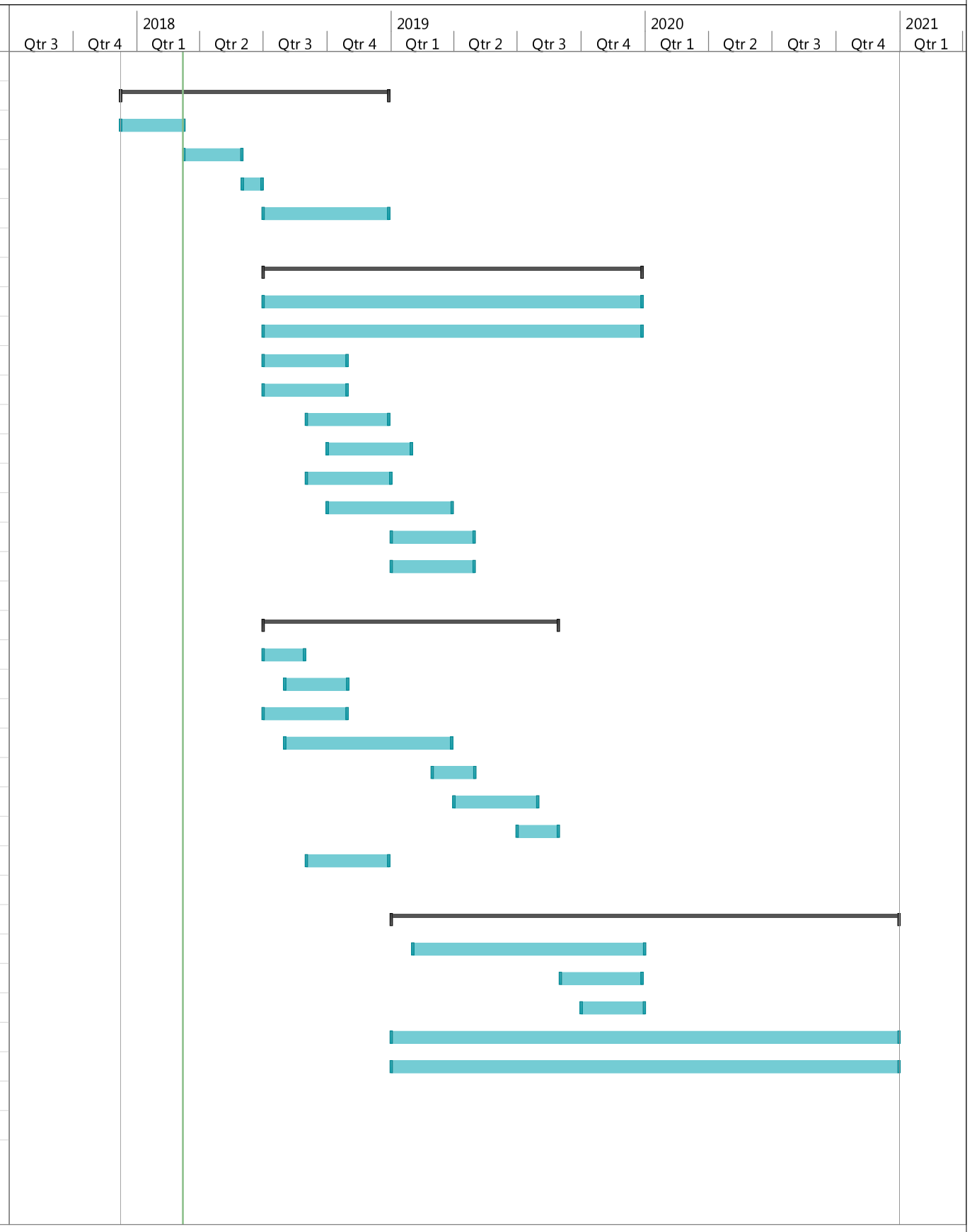
DISTILLATION COMPLEX COFIGURATION

Month Year Fig. #

APPENDIX C – PROJECT DEVELOPMENT SCHEDULE

Bi-National Canal for Salton Sea Restoration and Colorado River Augmentation
GEI Consultants, Inc.
March 9, 2018

ID	Task Name	Duration	Start	Finish
1				
2	**State Actions**	**275.5 days**	**Fri 12/8/17**	**Fri 12/28/18**
3	Issue RFP	13 wks	Fri 12/8/17	Thu 3/8/18
4	Review & Select Best Idea	11.9 wks	Fri 3/9/18	Thu 5/31/18
5	Award Implementation Contract to Best Idea Team	4.1 wks	Fri 6/1/18	Fri 6/29/18
6	Introduce/Enact Implementing Legislation	26.1 wks	Sun 7/1/18	Fri 12/28/18
7				
8	**Feasibility Study Costs**	**389.5 days**	**Sun 7/1/18**	**Fri 12/27/19**
9	Feasibility Study and EA Oversight w/ Agency Consultation	78.1 wks	Sun 7/1/18	Fri 12/27/19
10	Outside Counsel for Agreements w/ Mexico Agencies	78.1 wks	Sun 7/1/18	Fri 12/27/19
11	Land Access	17.3 wks	Sun 7/1/18	Mon 10/29/18
12	Horiz & Vertical Control Net	17.3 wks	Sun 7/1/18	Mon 10/29/18
13	Stake Canal Alignment	17.1 wks	Sat 9/1/18	Fri 12/28/18
14	Terrestrial Biology Survey	17.4 wks	Mon 10/1/18	Tue 1/29/19
15	Geotech on Tunnel Canals & Pump/Power Plant Sites	17.3 wks	Sat 9/1/18	Mon 12/31/18
16	Canal Design	25.9 wks	Mon 10/1/18	Fri 3/29/19
17	Pumping/Power Plant Design	17 wks	Tue 1/1/19	Mon 4/29/19
18	Electrical/Transmission/Solar/ Battery Design	17 wks	Tue 1/1/19	Mon 4/29/19
19				
20	**Prepare and Process Environmental Review for Phase 1 and Phase 2**	303 days	**Sun 7/1/18**	**Wed 8/28/19**
21	Identify Lead Agency	8.7 wks	Sun 7/1/18	Wed 8/29/18
22	Publish Project Description in Fed. Register	12.9 wks	Wed 8/1/18	Tue 10/30/18
23	Prepare Outline of Draft ER and Consult with Resource Agencies	17.3 wks	Sun 7/1/18	Mon 10/29/18
24	Prepare Agency Draft of ER	34.4 wks	Wed 8/1/18	Thu 3/28/19
25	Agencies Review of Agency Draft ER	8.6 wks	Fri 3/1/19	Tue 4/30/19
26	Incorporate Agency Comments into Draft Final ER	17.3 wks	Mon 4/1/19	Tue 7/30/19
27	Agency Review of Draft Final ER	8.6 wks	Mon 7/1/19	Wed 8/28/19
28	Final Revisions and Lead Agency Certification	17.1 wks	Sat 9/1/18	Fri 12/28/18
29				
30	**Design and Construction Costs**	521.5 days	**Tue 1/1/19**	**Wed 12/30/20**
31	Prepare Designs and Specification	47.4 wks	Fri 2/1/19	Mon 12/30/19
32	Surveying & Land Acquisition	17.1 wks	Sun 9/1/19	Fri 12/27/19
33	Advertise and Award Construction Contracts	12.9 wks	Tue 10/1/19	Mon 12/30/19
34	Construction Management	104.3 wks	Tue 1/1/19	Wed 12/30/20
35	Contractor Earnings	104.3 wks	Tue 1/1/19	Wed 12/30/20
36				
37				
38	Note: Phase 2 Costs will be largely spread over the 2021 to 2024 period -- Schedule to be developed when Phase 1 Feasibility Study is completed.			



APPENDIX D – APPRAISAL LEVEL COST ESTIMATES

Salton Sea Restoration and Southern CA Water Supply Project

Pre-Feasibility Study Cost Estimates -- DRAFT 3/2/2018

Phase 1

Item	Facility	Unit	Unit Cost	Quantity	Field Cost
Salton Sea Restoration Component					
1	Dredged Channel from Gulf to Laguna Salada Dam ~ 4,000 cfs, 40.88 miles (215,850' dead Level Invert @ -20')	lin. Ft.	$690	215,850	$148,936,500
2	Inlet structure from Gulf with 14 flat gates	LS	$4,268,000	1	$4,268,000
3	Hwy. MX5 crossing - Concrete box culvert	LS	$1,600,000	1	$1,600,000
4	Laguna Salada Canal 3,300 cfs, 52.33 miles long	lin. Ft.	$147	276,000	$40,572,000
5	Pumping Plant at beginning of Laguna Salada Canal 33,000HP	LS	$19,875,000	1	$19,875,000
6	Solar Power Array and Battery	LS	$60,000,000	1	$60,000,000
7	Laguna Salada Canal drainage crossings (1 per mile)	ea	$200,000	53	$10,600,000
8	Laguna Salada Canal crossings	ea	$500,000	10	$5,000,000
10	Highway Relocation (2 miles)	mile	$264,000	2	$528,000
11	Fish Screen	LS	$1,500,000	1	$1,500,000
12	UV Lights in Tunnel	LS	$96,000	1	$96,000
13	Tunnel beneath International Boundary, 3,300 cfs capacity, 6.0 miles long (31,680'), 28' diameter tunnel	lin. Ft.	$8,000	31,680	$253,440,000
14	Power Canal ~ 3,300 cfs, 27 miles long (142,560')	lin. Ft.	$147	142,560	$20,956,320
15	Power Canal Hwy. 98 bridge	LS	$864,000	1	$864,000
16	Power Canal Interstae 5 bored crossing	LS	$2,160,000	1	$2,160,000
17	Power Canal Railroad track and CA 580 Hwy. crossing	LS	$2,128,000	1	$2,128,000
18	Power Canal rural road bridges	ea	$576,000	4	$2,304,000
9	West Mesa Dam Dam ~ 60' high, 4 miles long	mile	$40,000,000	4	$160,000,000
19	Penstock ~15' Dia., 28,000 cfs, 4.16 miles long , 9 penstocks	lin. Ft.	$3,900	21,965	$85,663,500
20	Power Plant at base of Penstock ~ 3,300 cfs, TDH=157', 59,000 Hp, Static Head 224'	ea	$26,752,700	2	$53,505,400
21	Sheet Pile Discharge Training Wall in Sea ~ 29.80 miles (157,300') 40' long sheet piles	Sq. Ft.	$40	6,293,800	$251,752,000
				Subtotal	$1,125,748,720
				Contingency (45%)	$506,586,924
				Subtotal	**$1,632,335,644**
				Engineering, Legal, Adm. (15%)	$244,850,347
				Estimated Sea Restoration Component Capital Cost	**$1,877,185,991**

Salton Sea Restoration and Southern CA Water Supply Project

Pre-Feasibility Study Cost Estimates -- DRAFT 3/2/2018

Phase 1

Item	Facility	Unit	Unit Cost	Quantity	Field Cost
Power Transmission Component					
22	230 kV Single Circuit Transmission Line -- San Diego Substation to Midway Substation -- Serving New Substations at Hydro power plant Location	mile	$927,000	64.76	$60,032,520
23	230 KV Substation	LS	$1,648,000	1	$1,648,000
24	115 / 230 KV Transformers	LS	$7,000	2	$14,000
25	Cost per Line/XMFR Position	LS	$1,442,000	2	$2,884,000
				Subtotal	**$64,578,520**
				Contingency (45%)	$29,060,334
				Subtotal	**$93,638,854**
				Engineering, Legal, Adm. (15%)	$9,686,778
				Estimated Power System Capital Cost	**$103,325,632**
Land Acquisition & Mitigatioin Component					
26	Land Replacement for Biosphere	acres	$10,000	1962	$19,620,000
27	ROW in U.S.	acres	$20,000	1309	$26,180,000
28	Mitigation	LS	$15,000,000	1	$15,000,000
				Subtotal	**$60,800,000**
				Contingency (45%)	$27,360,000
				Subtotal	**$121,600,000**
				Engineering, Legal, Adm. (15%)	$9,120,000
				Estimated Power System Capital Cost	**$130,720,000**
				GRAND TOTAL TO DESIGN AND CONSTRUCT Phase 1	**$2,083,837,255**
Phase 1 O,M & R Estimate					
29	Canal O&M Based upon IID Costs	miles	$20,500	140	$2,870,000
30	Fish Screen & Ozone Facility at Mouth of Tunnel	LS	$150,000	1	$150,000
31	O, M & R of Hydro Peaking Facility - IID Rates	MW	$112,000	44	$4,928,000
				Estimated Phase 1 O, M & R Cost	**$7,948,000**

Salton Sea Restoration and Southern CA Water Supply Project

Pre-Feasibility Study Cost Estimates -- DRAFT 3/2/2018

Phase 2

Item	Facility	Unit	Unit Cost	Quantity	Field Cost
Desalination Component					
1	Gated Intake Structure 60' wide with Closure Gates, Low water at -245', Max Salton Sea Water Surface at -220'	LS		1	$0
2	Excavate Heat Exhange Chamber, Distillation Chambers (4) and Work Spaces (4) ; 2,200' long x 50' wide x 20' deep w/ floor elevation -245'	Cu. Yards	$12	500,000	$6,000,000
3	Structural Concrete to survive 8.0 Seismic Event - Heat Exhange Chamber, Distillation Chambers (4) and Work Spaces (4) ; 2,200' long x 50' wide x 20' deep w/ floor elevation -245'	Cu. Yards	$1,200	30,000	$36,000,000
4	Insulated Ceiling to survive 8.0 Seismic Event and retain 150 degree F heat in Heat Exhange Chamber, De-pressurized Distillation Chambers (4) and Work Spaces (4) ; 2,200' long x 50 wide - Bottom of Ceiling & Top of Water at -225' elevation	Cu. Yards	$1,200	16500	$19,800,000
5	Divider Partitions (pressurized) between Work Spaces 50' wide & 25' high	ea	$150,000	9	$1,350,000
6	Polypropylene Coating inside Distillation Chambers	Sq. Ft.	1	1240000	$1,240,000
7	HDPE Pipe, as follows:				$0
8	- HOT VAPOR COLLECTION PIPES: FOUR 72" HIGH-PRESSURE (VACUUM) HDPE PIPES EACH 300' LONG.	lin. Ft.	$550	1200	$660,000
9	- CONDENSATION PIPES: FORTY 24" THIN WALL HIGH-PRESSURE (VACUUM) HDPE PIPES EACH 1,000' LONG.	lin. Ft.	$175	40000	$7,000,000
10	- CONDENSATE MANIFOLDS: THREE 72" THIN WALL HIGH-PRESSURE (VACUUM) HDPE PIPES EACH 500' LONG.	lin. Ft.	$550	1500	$825,000
11	- HOT AIR INLET PIPES-PLENUM TO HEAT EXCHANGE CHAMBER: TWENTY 48" THIN WALL HDPE PIPES EACH 25' LONG .	ea	$8,500	20	$170,000
12	- MISC PIPING BETWEEN CHAMBERS: 24" HIGH PRESSURE HDPE PIPES 60' LONG.	ea	$10,000	160	$1,600,000
13	- 24' Cool/Dry air delivery pipes; 150' long	ea	$25,000	4	$100,000
14	- 550' long, 48" Cool/dry Air Plenum	ea	$175,000	1	$175,000
15	- ALL PIPE INLETS TO VACUUM CHAMBERS WILL BE THROUGH SPHINCTER VALVES.				
16	- Deliver Pipes from Air/Water Separators to E. Highline Canal - Three 72" Pipes 1,000' long	ea	$500,000	3	$1,500,000
17	Concrete Air/Water Separation Chambers 100' long x 30' wide x 10 'high (buried/insulated)	LS	$400,000	3	$1,200,000
18	MAN type RT71-1 single-stage TURBAIR Vacuum Blower	ea	$2,066,000	3	$6,198,000
19	50 MW sled Mounted Power Generating Units	ea	$25,000,000	3	$75,000,000
20	24" NATURAL GAS PIPELIE FROM RAILROAD - 5 MILES LONG WITH METERING VAULT.				
21	MATERIAL TRANSPORT CONVEYOR TO RAILROAD - 5 MILES LONG CARRYING 18,000 TONS/HOUR WITH TIPPLE @ RR.	lin. Ft.	$275	26400	$7,260,000
22	IMPROVE 4-MILE LONG NILAND MARINA ROAD TO FIRST CLASS PAVED HAUL-ROAD STANDARD	SF	$6	450000	$2,700,000
				Subtotal	$168,778,000
				Contingency (45%)	$75,950,100
				Subtotal	**$337,556,000**
				Engineering, Legal, Adm. (15%)	$50,633,400
				Estimated Desalination Facility Component Capital Cost	**$388,189,400**

Salton Sea Restoration and Southern CA Water Supply Project
Pre-Feasibility Study Cost Estimates -- DRAFT 3/2/2018
Phase 2

Item	Facility	Unit	Unit Cost	Quantity	Field Cost
Coachella Canal Exchange System					
23	Two pipelines each with 300 cfs capacity 3.55 miles long 102" steel Pipe	Lineal Feet	$650	37,500	$24,375,000
24	Pumping Plant - Static Head =243'; Friction = 22'; TDH=270'. HP= 11,500	HP	$600	11,500	$6,900,000
25	Pumping Plant inlet for 300 cfs	CFS	$1,000	300	$300,000
26	Energy Recovery Plant - Static Head =243'; Friction = 22'; TDH=220'. HP= 9,400	HP	$600	9400	$5,640,000
27	Inlet/Outlet Structure at Coachella Canal	LS	$750,000	1	$750,000
28	Surge Protection	LS	$1,000,000	1	$1,000,000
				Subtotal	**$38,965,000**
				Contingency (45%)	$17,534,250
				Subtotal	**$56,499,250**
				Engineering, Legal, Adm. (15%)	$5,844,750
				Estimated Power System Capital Cost	**$62,344,000**
East Highline Canal Lining & Pump-back Conveyance System					
29	East Highline Canal Lining 2,600 cfs, 55.28 miles long	lin. Ft.	$127	292,000	$34,813,000
30	Relift Pumping Check Stations with Thirteen 200 cfs (500 HP) pumps and twelve slide gates	Ea.	$11,252,000	16	$180,032,000
31	Power for Relift Pumps Thirteen 200 cfs (500 HP) pumps				
32	Canal Crossing Bridges - 230' long & 26' wide	Ea.	$720,000	55	$39,600,000
33	Lateral Turnouts	Ea.	$50,000	55	$2,750,000
				Subtotal	**$257,195,000**
				Contingency (45%)	$115,737,750
				Subtotal	**$514,390,000**
				Engineering, Legal, Adm. (15%)	$38,579,250
				Estimated Power System Capital Cost	**$552,969,250**
				GRAND TOTAL	**$1,003,502,650**

Salton Sea Restoration and Southern CA Water Supply Project
Pre-Feasibility Study Cost Estimates -- DRAFT 3/2/2018
Phase 2 - O, M & R Costs

Desalination Facility O&M					
34	Natural Gas	mcf	$5.00	7,500,000	$37,500,000
35	Labor (3 shifts 7 days per week + time off = 5 employees for each position) Need five employees at all times	Salary	$100,000	**15**	$1,500,000
36	Parts & Outside Services	LS	$2,500,000	**1**	$2,500,000
Canal O&M - Based on IID's AAC Section 5 (22.8 miles) Experience having Costs near $900,000/yr. or $20,500/mile					
Coachella Canal Exchange System					
37	Two pipelines each with 300 cfs capacity 3.55 miles long 102" steel Pipe	miles	$20,500	7.1	$145,550
East Highline Canal Lining & Pump-back Conveyance System					
38	East Highline Canal Lining 2,600 cfs, 55.28 miles long	miles	$20,500	55.28	$1,133,240
Energy Use					
18	MAN type RT71-1 single-stage TURBAIR Vacuum Blower				$187,916
19	50 MW sled Mounted Power Generating Units (Sale Credit)				-$3,780,000
24	Pumping Plant - Static Head =243'; Friction = 22'; TDH=270'. HP= 11,500				$360,173
25	Pumping Plant inlet for 300 cfs				
26	Energy Recovery Plant - Static Head =243'; Friction = 22'; TDH=220'. HP= 9,400				-$294,402
27	Power for Relift Pumps Thirteen 200 cfs (500 HP) pumps				$203,576
28	O&M, including Outside Services for EHL Pumpback IID's 24 MW Hydro system costs about $2.7 million per year or $112,000 per MW,	MW	$112,000	25	$2,800,000
	Estimated Phase 2 Desalination Facility/delivery Component Net Annual O, M & R Cost				$42,256,053

APPENDIX E – GEI FIRM OVERVIEW

Since 1970, providing creative engineering and science for holistic, collaborative solutions

GEI provides geotechnical, environmental, water resources and ecological consulting and engineering services. Professional staff provide these services from planning and design through construction and operations. Clients include government agencies, institutions, industries, developers, utilities, attorneys and other professional service firms.

Project Types

Airports
Bridges
Commercial Buildings
Dams and Levees
Educational Facilities
Garages and Parking Decks
Government Facilities
Harbors, Jetties, Piers, and Marinas
Hospitals and Medical Facilities
Industrial Buildings and Manufacturing Plants
Manufactured Gas Plant Sites
Mine Sites and Quarries
Pipelines and Pumping Stations
Railroads
Rivers, Canals, and Waterways
Tunnels and Subways
Urban Renewals
Utilities and Power Generation
Water Supply, Treatment and Distribution

Geotechnical Services

Foundations
Excavation Support Systems
Trenchless Technology and Tunneling
Embankments and Dams
Forensic Engineering & Litigation Support
Groundwater
Coastal Planning and Engineering

Environmental Services

Compliance and Permitting
Expert Services
Investigation through Remediation
Manufactured Gas Plant (MGP) Sites
Real Estate & Brownfields Redevelopment

Civil Design

Civil Engineering
Geostructural
Design-Build
Construction Support

Water Resources Services

Conveyance
Flood Control
Water Management
Water Supply and Storage
Water Resources Support
Hydropower

Ecological Services

Biomonitoring
Ecotoxicology and Water Quality Assessments
Environmental Impact Assessment
Aquatic Habitat Enhancement
Inventories and Surveys of Aquatic Ecosystems
Permitting
Laboratory Services

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