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June 6, 2018

Addendum No.: 2

City Project No. 17-22, North Valley Regional Recycled Water Pipeline – Turlock Component

Plan holders:

Addendum No. 1 has been prepared by Carollo Engineers and is attached hereto and consists of 65 pages:

Page 1-2	Cover
Page 3-4	Table of Contents
Page 5-65	Changes to specifications

If you have any questions, please contact me at (209) 668-5417 or email at sfremming@turlock.ca.us.

Sincerely,

Stephen Fremming
Senior Civil Engineer



**CITY OF TURLOCK
TURLOCK, CA**

NORTH VALLEY REGIONAL RECYCLED WATER PROGRAM

CLIENT PROJECT NO. 17-22A

**ADDENDUM NO. 2
TO THE
CONTRACT DOCUMENTS**

June 2018



Bid Set Signed by:

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Bidders on the above-named project are hereby notified that the Bidding Documents are modified as indicated below. Bidders are required to acknowledge receipt of this Addendum in the space provided on the Document 00410 Bid Form.

This Addendum No. 2 shall become part of the Contract and provisions of the Contract apply.

SPECIFICATIONS

The following sections are modified as indicated below.

1. SECTION 00002 - TABLE OF CONTENTS:
 - a. ADD "01265 - Value Engineering" to page ii after 01260- Contract Modification Procedures.
2. SECTION 01265 - VALUE ENGINEERING
 - a. ADD new specification included in attached section.
3. SECTION 01355A – STORMWATER POLLUTION PREVENTION CONSTRUCTION ACTIVITIES: BEST MANAGEMENT PRACTICES:
 - a. REPLACE section in its entirety with the attached section.
4. SECTION 01450 - QUALITY CONTROL:
 - a. REPLACE section in its entirety with the attached section.
5. SECTION 01455 - SPECIAL TESTS AND INSPECTIONS
 - a. REPLACE section in its entirety with the attached section.
6. SECTION 01738 – SELECTIVE ALTERATIONS AND DEMOLITION:
 - a. REPLACE section in its entirety with the attached section.
7. SECTION 02240 - DEWATERING:
 - a. REPLACE section in its entirety with the attached section.
8. SECTION 02261 – SHAFT EXCAVATION AND SUPPORT FOR TRENCHLESS PIPELINE INSTALLATION:
 - a. REPLACE section in its entirety with the attached section.

SECTION 01265 ^{AD2}

VALUE ENGINEERING

PART 1 GENERAL

1.01 SUMMARY

- A. This section applies to cost reduction proposals, hereinafter referred to as Value Engineering Cost Proposal (VECP), initiated and developed by CONTRACTOR to change requirements of the Contract for sole purpose of reducing total cost of construction. It is the intent that the VECP Construction Savings Amount, as defined herein, will be shared between CONTRACTOR and OWNER.
- B. Identify VECP proposal as such at the time of submission to CONSTRUCTION MANAGER.
- C. VECP, if adopted, shall result in a savings to OWNER by providing a decrease in cost for performing the Work without impairing any of the essential functions and characteristics such as service life, reliability, economy of operation, ease of maintenance, desired appearance, and safety features.
- D. Do not base VECP solely upon a change in specified quantities.
- E. CONTRACTOR may withdraw the whole or part of a submitted VECP prior to acceptance by OWNER.
- F. Related sections:
 - 1. The Contract Documents are complementary; what is called for by one is as binding as if called for by all.
 - 2. It is the CONTRACTOR's responsibility for scheduling and coordinating the Work of subcontractors, suppliers, and other individuals or entities performing or furnishing any of CONTRACTOR's Work.

1.02 CONCURRENT CONTRACT SAVINGS

- A. Concurrent contract savings on other OWNER contracts where Subcontractor is participating are not allowed.

1.03 DEFINITIONS

- A. Collateral Savings: Measurable net reductions in OWNER's costs of operation that result from VECP including maintenance, logistics and OWNER-furnished equipment.
- B. Concurrent Savings: Savings from other OWNER contracts where CONTRACTOR is or is not participating.
- C. CONTRACTOR Costs: Reasonable costs incurred by CONTRACTOR in preparing VECP and making the change, such as cancellation or restocking charges.

- D. Future Contract Savings: Reductions in cost of performance of future contracts for essentially the same item resulting from VECP submitted by CONTRACTOR.
- E. Gross Savings Amount: The gross savings amount to Contract, before deductions of OWNER and CONTRACTOR Costs.
- F. VECP Construction Savings Amount: Net amount of Contract Price reduction to be realized by implementation of VECP; the Gross Savings Amount less OWNER and CONTRACTOR Costs.
- G. OWNER's Costs: Reasonable costs, including associated engineering costs, incurred by OWNER for evaluating and implementing VECP, such as redesign, testing, and effect on other contracts, including right of way acquisition costs.

1.04 AREAS NOT TO BE CONSIDERED

- A. The following areas will not be considered for VECP submissions:
 - 1. Changing the design capacity or flow rate.
 - 2. Changing the pipeline alignment or minimum depth.
 - 3. Changing the pipeline material or material thickness.
 - 4. Changes that would result in violating environmental, regulatory, or permit requirements.
 - 5. Equipment or other items that are sole sourced or listed with "no equal."

1.05 PREPROPOSAL SCREENING

- A. VECP proposals shall have a VECP Construction Savings Amount of not less than \$20,000. (This amounts to a minimum of \$10,000 to the Owner after expenses.) If the minimum total savings is not in excess of \$20,000, then the VECP will not be considered.
- B. Upon request, and with approval of CONSTRUCTION MANAGER, a preproposal screening meeting will be scheduled for CONTRACTOR to present anticipated proposal.
- C. CONSTRUCTION MANAGER, ENGINEER, CONTRACTOR's ENGINEER, CONTRACTOR, OWNER and, if applicable, Subcontractor or Supplier will be present at meeting.
- D. CONSTRUCTION MANAGER AND OWNER will render a preliminary opinion as to relative merits of proposal during meeting. CONTRACTOR is not to assume acceptance of VECP based on CONTRACTOR's ENGINEER or OWNER concurrence with merits of preliminary proposal.
- E. If proposal is found to have merit, CONSTRUCTION MANAGER will confirm minimum technical content requirements to be submitted by CONTRACTOR with the intent to minimize proposal resubmittals.
- F. Any VECP received that has not been introduced in a preproposal screening may be rejected without review.

1.06 VECP PROPOSAL SUBMITTAL

- A. Prepare and submit per Section 01330.
- B. Include, as a minimum, the following information with each VECP:
 - 1. Description of the difference between existing Contract requirement and VECP
 - 2. Comparative advantages and disadvantages between Contract requirement and VECP.
 - 3. Itemization of requirements of Contract that must be changed if VECP is adopted, and a recommendation as to how to make such change (e.g., drawing numbers and specifications). Include all redesign required for the VECP including any other items affected by the VECP.
 - 4. Justification for change in function or characteristic of each affected item and effect of change on performance of end item.
 - 5. Detailed cost estimate, with itemized breakdown containing quantities and unit prices for both original design and proposed change. Cost estimate shall include CONTRACTOR Costs, including amounts attributable to subcontracts. Basis for estimate shall also be included.
 - 6. Prediction of effects VECP would have on OWNER Costs, such as additional engineering costs, OWNER-furnished equipment costs, costs of related items, and costs of maintenance and operation.
 - 7. Statement of time by which a Change Order adopting VECP must be issued, so as to obtain maximum cost reduction and to avoid and minimize schedule extensions.
 - 8. Proposed revisions to construction schedule, if any.
 - 9. A detailed design of the VECP stamped and signed by a professional engineer licensed in the state of California.
- C. Contractor may withdraw part or all of any VECP at any time prior to acceptance by the OWNER. Such withdrawal shall be made in writing to the CONSTRUCTION MANAGER.
- D. The VECP shall remain valid for a period of 60 days from the date submitted, unless extended by agreement between the CONTRACTOR and OWNER. If the VECP is withdrawn prior to the expiration of this period, or prior to acceptance of the VECP by the Owner, whichever is earlier, Contractor shall be liable for the costs incurred by the OWNER in reviewing the withdrawn VECP.
- E. CONSTRUCTION MANAGER has right to reject, without review, any VECP that does not contain required documentation specified herein.
- F. OWNER has the sole discretion for rejecting or accepting VECP proposals. Any acceptance or rejection of a VECP shall be final and cannot be appealed.

1.07 CONSTRUCTION SAVINGS SHARING

- A. If VECP is accepted, VECP will be equivalent to the agreed estimated net savings amount.
 - 1. The CONTRACTOR's cost of preparing the VECP proposal and the OWNER's costs of investigating a VECP proposal, including any portion thereof paid by the Contractor, shall be excluded from consideration in determining the estimated net savings in construction costs.

- B. Construction shared savings shall be calculated in accordance with the following:
 - 1. For VECP proposals with a VECP construction savings amount of less than \$150,000 the resulting deductive Change Order shall be 50% of the VECP construction savings amount.
 - 2. For VECP proposals with a VECP construction savings amount of greater than \$150,000 the resulting deductive Change Order shall be 50% of the VECP construction savings amount for the first \$150,000 and 60% for savings above this amount.
- C. The sharing of savings as stated in this Section shall constitute the sole and entire compensation for acceptance and unrestricted use of the VECP by the OWNER, whether under this Contract or in other uses.
- D. Any and all additional costs, construction, or engineering requirements, and coordination efforts required to implement or accommodate the VECP into the work shall be the responsibility and risk of the Contractor.
- E. The CONTRACTOR accepts the risk of any unanticipated cost or time which may become evident during implementation of the VECP

1.08 EXECUTABLE VECP

- A. If the VECP is accepted, a deductive Change Order will be prepared, in accordance with this section and Section 01260 of the Contract Documents, adjusting Contract Price and other affected provisions.
- B. Unless and until a VECP Change Order is executed by both parties, CONTRACTOR shall remain obligated to perform in accordance with terms and conditions of the Contract.
- C. Acknowledge acceptance of all VECPs in writing within seven days after receipt of notice from the CONSTRUCTION MANAGER. A VECP may be withdrawn, fully or partially, within this time.
- D. Acceptance of VECP and performance of the Work thereunder shall not extend Contract Times, unless specifically provided for in the Change Order authorizing VECP.
- E. CONTRACTOR's profit shall not be reduced by application of VECP.
- F. CONTRACTOR is not entitled to share in concurrent, collateral, or future contract savings.
- G. OWNER may accept, in whole or in part, submitted VECP. OWNER may modify a VECP, with concurrence of CONTRACTOR, to make it acceptable.
- H. OWNER or CONSTRUCTION MANAGER shall not be liable for delays in acting upon, or for failure to act upon, a submitted VECP.
- I. Decisions of OWNER as to acceptance of VECP under these Contract Documents shall be final and shall not be subject to the "Claims" clause of Contract.

- J. CONTRACTOR may restrict OWNERS' right to use any portion of a VECP or its supporting data, submitted pursuant to this section, in accordance with the terms of the following if it is noted on such.
1. "These data are furnished pursuant to a value engineering change proposal and shall not be disclosed to an entity other than Owner, Engineer and Construction Manager, or to be duplicated, used or disclosed, in whole or in part, for any purpose other than to evaluate a value engineering change proposal. This restriction does not limit Owner's right to use information contained in these data if it is or has been obtained from another source, or is otherwise available without limitations. If such a proposal is accepted by Owner by issuance of a Change Order, Owner shall have the right to duplicate, use and disclose any data pertinent to the proposal as accepted, in any manner and for any purpose whatsoever."
- K. In the event of acceptance of VECP, CONTRACTOR hereby grants to OWNER all rights to use, duplicate, or disclose in whole or part, in any manner and for purpose whatsoever, and to have or permit others to do so, any data reasonably necessary to fully utilize such proposal.

1.09 NONEXECUTABLE VECP

- A. If VECP is not accepted, CONSTRUCTION MANAGER will notify CONTRACTOR in writing, explaining reasons. CONTRACTOR's costs of development of VECP are nonrecoverable in such an event.
- B. In the event CONTRACTOR withdraws from VECP that has been previously agreed upon by all parties, CONTRACTOR's ENGINEER's costs for evaluating VECP will not be included in the project cost of work invoiced by the CONTRACTOR.
- C. If the CONTRACTOR determines for whatever reason, not to implement an approved and accepted VECP, Contractor shall be liable for the costs incurred by the Owner in reviewing the VECP.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

AD2 Addendum No. 2

SECTION 01355A

STORMWATER POLLUTION PREVENTION CONSTRUCTION ACTIVITIES: BEST MANAGEMENT PRACTICES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Requirements for the preparation and implementation of the Stormwater Pollution Prevention Plan (SWPPP) for the Contractor's construction activities. This document (and other identified in this Section will be used for the purpose of applying for and obtaining a State of California General Construction Activity Stormwater Permit. This permit authorizes the discharge of stormwater associated with construction activities from the construction site.

1.02 REFERENCES

- A. National Pollutant Discharge Elimination System (NPDES).
- B. State of California, State Water Resources Control Board, Regional Water Quality Control Board (SWRCB).
- C. United States Code of Federal Regulation (CFR):
 - 1. 40 - Protection of Environmental:
 - a. 117 - Determination of reportable quantities for hazardous substance.
 - b. 302 - Designation, reportable quantities, and notification.

1.03 SUBMITTALS

- A. Construction General Permit:
 - 1. The Contractor shall prepare and submit all Permit Registration Documents (PRD's) to the Engineer and Construction Manager for review, approval, and certification by the Legally Responsible Person (LRP) prior to start of work and mobilization:
 - a. The LRP will electronically submit the PRDs to the Stormwater Multiple Application and Report Tracking System (SMARTS) to obtain approval of the Construction General Permit (CGP).
 - 2. The PRD's shall include but are not limited to the Notice of Intent (NOI), Risk Determination Worksheet, Site Maps, Stormwater Pollution Prevention Plan (SWPPP), Annual Fee's and Owner Certification. It shall also include all other reports, calculations, studies, exhibits, and documentation required to obtain the CGP.
 - 3. The Contractor shall provide a Qualified SWPPP Practitioner (QSP), who will be responsible for maintaining the existing CGP active throughout the duration of the project:
 - a. The Contractor shall be responsible for providing all reports required by the CGP (monitoring, inspection, Rain Event Action Plans, sampling, exceedance reports, annual reports, etc.) to the Engineer and Construction Manager for review.

- b. Upon approval, the Contractor's QSP shall upload the information to SMARTS.
 - c. Time sensitive reports involving monitoring data shall be provided as soon as the information is made available.
 - d. All other reports shall be provided to the Engineer and Construction Manager a minimum of 2 weeks prior to their deadline for submittal to the SWRCB through SMARTS.
 - e. All CGP documents shall be submitted to the Owner for reference and a copy shall be located on site at all times.
- B. Pollution Prevention Plan:
 - 1. Prepare and submit a site-specific Stormwater Pollution Prevention Plan (SWPPP) in accordance with Section A of the General Construction Activity Stormwater Permit to the Owner for reference.
 - 2. Prepare and submit a monitoring program and reporting plan in accordance with Section B of the General Construction Activity Stormwater Permit to the Owner for reference.
 - 3. Submit to the Owner for reference a Stormwater Pollution Prevention Plan detailing the placement of physical Best Management Practices (BMPs) required for installation and the methods used to comply with those BMPs directed at operational procedures, Monitoring Program, and Reporting Plan.
 - 4. The plan shall specifically address and detail changes from the alternatives called out in this Section. The Contractor's preferred techniques shall show how it will comply with the stated objectives of the program.
 - 5. The SWPPP shall be prepared and amended by a Qualified SWPPP Developer (QSD), as defined by the CGP.
- C. The Contractor shall submit a copy of the BMP Handbook with each BMP to be utilized check marked to show compliance or marked to show deviation.
- D. The entire plan shall be kept and maintained by the Contractor on the construction site during the duration of the project.
- E. The Contractor shall be responsible for taking the proper actions to prevent contaminants and sediments from entering the storm sewer drainage system should any unforeseen circumstance occur. The Contractor shall take immediate action if directed by the Engineer or Construction Manager, or if the Contractor observes contaminants and/or sediments entering the storm drainage system, to prevent further stormwater from entering the system.

1.04 REGULATORY REQUIREMENTS

- A. The Contractor shall comply with the State Water Resources Control Board, Regional Water Quality Control Board, county, city, and other local agency requirements regarding stormwater discharges and management.
- B. The Contractor shall not begin any construction work until the Owner receives the State of California General Construction Activity Stormwater Permit. The Contractor shall allow the Owner 30 days to obtain this permit after receipt of the information listed in this Section.

- C. The Contractor shall comply with the following prohibitions and limitations, which are contained in the Stormwater Permit:
 - 1. Discharge prohibitions:
 - a. Discharges of materials other than stormwater, which are not otherwise regulated by a NPDES permit, to a separate stormwater sewer system or water of the nation are prohibited.
 - b. Stormwater discharges shall not cause or threaten to cause pollution, contamination (including sediment), or nuisance.
 - c. Stormwater discharges regulated by this general permit shall not contain a hazardous substance equal to or in excess of a reportable quantity listed in 40 CFR 117 and 40 CFR 302.
 - 2. Receiving water limitations:
 - a. Stormwater discharges to any surface or groundwater shall not adversely impact human health or the environment.
 - b. Stormwater discharge shall not cause or contribute to a violation of any applicable water quality standards contained in the California Ocean Plan, Inland Surface Waters and Enclosed Bays and Estuaries Plan, or the applicable Regional Water Board's Basin Plan.
- D. Requirements:
 - 1. In order to comply with the permit mandates the Stanislaus County has developed a County-Wide Stormwater Pollution Prevention Program and Best Management Practices (BMPs) that are suggested to be utilized by the Contractor. BMPs are measures or practices used to reduce the amount of pollution entering surface water. BMPs may take the form of a process, activity, or physical structure. Some BMPs are simple and can be put into place immediately, while others are more complicated and require extensive planning or space. They may be inexpensive or costly to implement. No additional compensation shall be made for implementation of BMPs.
 - 2. The Stanislaus County-Wide Stormwater Pollution Prevention Program and Summary of BMPs are available for review at the Owner's Water Quality Control Plant.

1.05 STORMWATER POLLUTION PREVENTION PLAN IMPLEMENTATION

- A. The Contractor's QSP shall implement all activities required by the General Permit and as detailed in the Stormwater Pollution Prevention Plan, Monitoring Program, and Reporting Plan.

1.06 NON-STORMWATER MANAGEMENT

- A. The Stormwater Pollution Prevention Plan shall discuss any non-stormwater sources (i.e., landscaping irrigation, pipe flushing, street washing, and dewatering). In addition, the Plan shall include standard observation measures and best management practices, including best available technologies economically achievable and best conventional pollutant control technologies that are to be implemented in order to reduce the pollutant loading to the waters.

1.07 AMENDMENTS

- A. The Contractor's QSP shall amend the Stormwater Pollution Prevention Plan, Monitoring Program, and Reporting Plan whenever there is a change in construction or operations which may affect the discharge of pollutants to stormwater.

- B. The Stormwater Pollution Prevention Plan shall also be amended if it is in violation of any conditions of the general permit or has not achieved the general objective of reducing pollutants in stormwater discharges.
- C. All amendments shall be completed at no additional cost to the Owner.

1.08 ANNUAL SUMMARY

- A. Contractor:
 - 1. Prepare an annual summary report (annual report) in accordance with all Regional Water Quality Control Board requirements.
 - 2. Utilize the annual report form available in the SMARTS, and submit it to the Engineer and Construction Manager a minimum of 2 weeks prior to the deadline for submittal.
 - 3. Upon approval of the report by the Engineer or Construction Manager, the LRP will review and certify the report for final submittal via SMARTS.

1.09 NOTICE OF TERMINATION

- A. The Contractor shall provide all necessary information for the completion of a Notice of Termination (NOT) upon completion of all construction activities (refer to Section C of the General Construction Activity Stormwater Permit for general requirements). Upon review of the information submitted, the LRP will certify and submit the NOT via SMARTS.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Nonhazardous material/waste management:
 - 1. Designated area: The Contractor shall propose designated areas of the project site, for approval by the Engineer or Construction Manager, suitable for material delivery, storage, and waste collection that, to the maximum extent practicable, are near construction entrances and away from catch basins, gutters, drainage courses, and creeks.
 - 2. Granular material:
 - a. The Contractor shall store granular material at least 50 feet away from catch basin and curb returns.
 - b. The Contractor shall not allow granular material to enter storm drains, creeks, or rivers.
 - c. When rain is forecast within 24 hours or during wet weather, the Engineer or Construction Manager may require the Contractor to cover granular material with a tarpaulin and to surround the material with sand bags:
 - 1) All stockpiles are required to be protected immediately if they are not scheduled to be used within 14 days.
 - 3. Dust control: The Contractor shall use ~~reclaimed-non-potable~~^{AD2} water to control dust on a daily basis or as directed by the Construction Manager.

4. Street sweeping and vacuuming:
 - a. At the end of each working day or as directed by the Engineer or Construction Manager, the Contractor shall clean and sweep roadways and on-site paved areas of all materials attributed to or involved in the work.
 - b. The Contractor shall not use water to flush down streets in place of street sweeping.
 - c. Additionally, the Contractor shall not use kick brooms or sweeper attachments.
- B. Spill prevention and control:
 1. The Contractor shall keep a stockpile of spill cleanup materials, such as rags or absorbents, readily accessible on-site.
 2. The Contractor shall immediately contain and prevent leaks and spills from entering storm drains, and properly clean up and dispose of the waste and cleanup materials:
 - a. If the waste is hazardous, the Contractor shall dispose of hazardous waste only at authorized and permitted treatment, storage, and disposal facilities, and use only licensed hazardous waste haulers to remove the waste off-site, unless quantities to be transported are below applicable threshold limits for transportation specified in State and Federal regulations.
 3. The Contractor shall not wash any spilled material into streets, gutters, storm drains, creeks, or rivers and shall not bury spilled hazardous materials.
 4. The Contractor shall immediately report any hazardous materials spill to the Owner, Engineer, and Construction Manager for reporting to all applicable regulatory agencies.
- C. Vehicle/equipment cleaning:
 1. The Contractor shall not perform vehicle or equipment cleaning on-site or in the street using soaps, solvents, degreasers, steam cleaning equipment, or equivalent methods.
 2. The Contractor shall perform vehicle or equipment cleaning, with water only, in a designated, bermed area that will not allow rinse water to run off-site or into streets, gutters, storm drains, creeks or rivers.
- D. Vehicle/equipment maintenance and fueling:
 1. The Contractor shall perform maintenance and fueling of vehicles or equipment in designated, bermed area(s) or over a drip pan that will not allow run-on of stormwater or runoff of spills.
 2. The Contractor shall use secondary containment, such as a drip pan, to catch leaks or spills any time that vehicle or equipment fluids are dispensed, changed, or poured.
 3. The Contractor shall keep a stockpile of spill cleanup materials, such as rags or absorbents, readily accessible on-site.
 4. The Contractor shall clean up leaks and spills of vehicle or equipment fluids immediately and dispose of the waste and cleanup materials as hazardous waste, as described in section "Spill prevention and control" above.
 5. The Contractor shall not wash any spilled material into streets, gutters, storm drains, creeks, or rivers and shall not bury spilled hazardous materials.
 6. The Contractor shall report any hazardous materials spill to the Owner, Engineer, and Construction Manager and all applicable regulatory agencies.

7. The Contractor shall inspect vehicles and equipment arriving on-site for leaking fluids and shall promptly repair leaking vehicles and equipment. Drip pans shall be used to catch leaks until repairs are made.
8. The Contractor shall recycle waste oil and antifreeze, to the maximum extent practicable.
9. The Contractor shall comply with Federal, State, and City requirements for aboveground storage tanks.

E. Contractor training and awareness:

1. Contractor's QSP shall train all employees/subcontractors on the stormwater pollution prevention requirements contained in these specifications.
2. Contractor's QSP shall inform subcontractors of the stormwater pollution prevention contract requirements and include appropriate subcontract provisions to ensure that these requirements are met.
3. Contractor shall post warning signs in areas treated with chemicals.
4. Contractor shall paint new, reset or raised catch basins, constructed as part of the project, with a "No Dumping" stencil.

3.02 SPECIFIC REQUIREMENTS

A. Paving operations:

1. Project site management:
 - a. When rain is forecast within 24 hours or during wet weather, the Engineer or Construction Manager may prevent the Contractor from paving.
 - b. The Engineer or Construction Manager may direct the Contractor to protect drainage courses by using control measures, such as earth dike, straw bale, and sand bag, to divert runoff or trap and filter sediment in addition to those already shown on the construction plan sheets.
 - c. The Contractor shall place drip pans or absorbent material under paving equipment when not in use.
 - d. The Contractor shall cover catch basins and manholes when paving or applying seal coat, tack coat, slurry seal, or fog seal.
 - e. If the paving operation includes an on-site mixing plant, the Contractor shall comply with applicable Federal, State, and local General Industrial Activities Stormwater Permit requirements.
2. Paving waste management:
 - a. The Contractor shall not sweep or wash down excess sand (placed as part of a sand seal or to absorb excess oil) into gutters, storm drains, or creeks:
 - 1) Instead, the Contractor shall either collect the sand and return it to the stockpile, or dispose of it in a trash container.
 - b. The Contractor shall not use water to wash down fresh asphalt concrete pavement.

B. Saw cutting:

1. During saw cutting, the Contractor shall cover or barricade catch basins using control measures, such as filter fabric, straw bales, sand bags, and fine gravel dams, to keep slurry out of the storm drain system. When protecting a catch basin, the Contractor shall ensure that the entire opening is covered.
2. The Contractor shall vacuum saw cut slurry and pick up the waste prior to moving to the next location or at the end of each working day, whichever is sooner.

3. If saw cut slurry enters catch basins, the Contractor shall remove the slurry from the storm drain system immediately.
- C. Concrete, grout, and mortar waste management:
1. Material management: The Contractor shall store concrete, grout, and mortar away from drainage areas and ensure that these materials do not enter the storm drain system.
 2. Concrete truck/equipment washout:
 - a. The Contractor shall not washout concrete trucks or equipment into streets, gutters, storm drains, creeks, or rivers:
 - 1) Washout areas should be located at least 50 feet from storm drains, open ditches, or water bodies.
 - b. The Contractor shall perform washout of concrete trucks or equipment in a designated area:
 - 1) Washout site should be lined so there is no discharge into the underlying soil.
 3. Exposed aggregate concrete wash water:
 - a. The Contractor shall avoid creating runoff from washing of exposed aggregate concrete. The Contractor shall collect and return sweepings from exposed aggregate concrete to a stockpile or dispose of the waste in a trash container.

END OF SECTION

AD2 Addendum No. 2

SECTION 01450
QUALITY CONTROL

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Quality control and control of installation.
 - 2. Tolerances.
 - 3. References.
 - 4. Mock-up requirements.
 - 5. Authority and duties of Owner's representative or inspector.
 - 6. Sampling and testing.
 - 7. Testing and inspection services.
 - 8. Contractor's responsibilities.
- B. Related section:
 - 1. Section 01455 - Special Tests and Inspections.

1.02 QUALITY CONTROL AND CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. When manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform Work by persons qualified to produce required and specified quality.
- F. Verify field measurements are as indicated on Shop Drawings or as instructed by manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.
- H. When specified, products will be tested and inspected either at point of origin or at Work site:
 - 1. Notify Engineer and Construction Manager in writing well in advance of when products will be ready for testing and inspection at point of origin.
 - 2. Do not construe that satisfactory tests and inspections at point of origin is final acceptance of products. Satisfactory tests or inspections at point of origin do not preclude retesting or re-inspection at Work site.

- I. Do not ship products which require testing and inspection at point of origin prior to testing and inspection.

1.03 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. When Manufacturers' tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

1.04 REFERENCES

- A. American Society for Testing and Materials (ASTM): E 329 - Standard for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.
- B. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of standard, except when more rigid requirements are specified or are required by applicable codes.
- C. Conform to reference standard by date of issue current on date of Contract Documents, except where specific date is established by code.
- D. Obtain copies of standards where required by product specification sections.
- E. When specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.

1.05 MOCK-UP REQUIREMENTS

- A. Tests will be performed under provisions identified in this Section and identified in respective product specification sections.
- B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- C. Accepted mock-ups shall be comparison standard for remaining Work.
- D. Where mock-up has been accepted by Engineer or Construction Manager and is specified in product specification sections to be removed; remove mock-up and clear area when directed to do so by Engineer or Construction Manager.

1.06 AUTHORITY AND DUTIES OF OWNER'S REPRESENTATIVE OR INSPECTOR

- A. Owner's Project Representative employed or retained by Owner is authorized to inspect the Work.
- B. Inspections may extend to entire or part of the Work and to preparation, fabrication, and manufacture of products for the Work.

- C. Deficiencies or defects in the Work which have been observed will be called to Contractor's attention.
- D. Inspector will not:
 - 1. Alter or waive provisions of Contract Documents.
 - 2. Inspect Contractor's means, methods, techniques, sequences, or procedures for construction.
 - 3. Accept portions of the Work, issue instructions contrary to intent of Contract Documents, or act as foreman for Contractor. Supervise, control, or direct Contractor's safety precautions or programs; or inspect for safety conditions on Work site, or of persons thereon, whether Contractor's employees or others.
- E. Inspector will:
 - 1. Conduct on-site observations of the Work in progress to assist Engineer and Construction Manager in determining when the Work is, in general, proceeding in accordance with Contract Documents.
 - 2. Report to Engineer and Construction Manager whenever Inspector believes that Work is faulty, defective, does not conform to Contract Documents, or has been damaged; or whenever there is defective material or equipment; or whenever Inspector believes the Work should be uncovered for observation or requires special procedures.

1.07 SAMPLING AND TESTING

- A. General:
 - 1. Prior to delivery and incorporation in the Work, submit listing of sources of materials, when specified in sections where materials are specified.
 - 2. When specified in sections where products are specified:
 - a. Submit sufficient quantities of representative samples of character and quality required of materials to be used in the Work for testing or examination.
 - b. Test materials in accordance with standards of national technical organizations.
- B. Sampling:
 - 1. Furnish specimens of materials when requested.
 - 2. Do not use materials which are required to be tested until testing indicates satisfactory compliance with specified requirements.
 - 3. Specimens of materials will be taken for testing whenever necessary to determine quality of material.
 - 4. Assist Construction Manager in preparation of test specimens at site of work, such as soil samples and concrete test cylinders.

1.08 TESTING AND INSPECTION SERVICES

- A. ~~Contractor-Construction Manager~~^{AD2} will employ and pay for specified services of an independent firm to perform Contractor quality control testing as required in the technical specifications for various work and materials.
- ~~B. Owner will employ and pay for specified services of an "Owner's independent testing firm" to perform testing and inspection as required in the technical~~

~~specifications for various work and materials or stipulated in Section 01455 to confirm Contractor's compliance with Contract Documents:~~

- ~~1. If Engineer, Construction Manager, or Owner's independent testing firm is not properly certified to perform specialty inspections required by the building department, Owner will employ and pay for a quality specialty inspection firm to perform required testing and inspection.~~^{AD2}

~~C.B.~~ The ~~Owner's~~ independent testing firm will perform tests, inspections and other services specified in individual specification sections and as required by Owner and requested by the Engineer or Construction Manager.

~~D.C.~~ The qualifications of laboratory that will perform the testing, contracted by the ~~Owner or by the Contractor~~ Construction Manager, shall be as follows:

1. Has authorization to operate in the state where the project is located.
2. Meets "Recommended Requirements for Independent Laboratory Qualification," published by American Council of Independent Laboratories.
3. Meets requirements of ASTM E 329.
4. Laboratory Staff: Maintain full time specialist on staff to review services.
5. Testing Equipment: Calibrated at reasonable intervals with devices of accuracy traceable to National Bureau of Standards (NBS) or accepted values of natural physical constants.
6. Will submit copy of report of inspection of facilities made by Materials Reference Laboratory of NBS during most recent tour of inspection, with memorandum of remedies of deficiencies reported by inspection.

~~E.D.~~ Testing, inspections and source quality control may occur on or off project site. Perform off-site testing inspections and source quality control as required by Engineer, Construction Manager, or Owner.

~~F.E.~~ Reports will be submitted by ~~Owner's the~~ independent testing firm to Engineer, Construction Manager, Contractor, and Owner in triplicate, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents. Each report shall include:

1. Date issued.
2. Project title and number.
3. Testing laboratory name, address, and telephone number.
4. Name and signature of laboratory inspector.
5. Date and time of sampling or inspection.
6. Record of temperature and weather conditions.
7. Date of test.
8. Identification of product and specification section.
9. Location of sample or test in Project.
10. Type of inspection or test.
11. Results of tests and compliance with Contract Documents.
12. Interpretation of test results, when requested by Engineer or Construction Manager.

~~G.F.~~ Contractor shall cooperate with ~~Owner's the~~ independent testing firm, furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested:

1. Notify Engineer, Construction Manager, and Owner's independent testing firm 48 hours prior to expected time for operations requiring testing.

2. Make arrangements with ~~Owner's~~ the independent testing firm and pay for additional samples and tests required for Contractor's use.

~~H.G.~~ Limitations of authority of testing Laboratory: ~~Owner's~~ The independent testing firm or Laboratory is not authorized to:

1. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Agency or laboratory may not approve or accept any portion of the Work.
3. Agency or laboratory may not assume duties of Contractor.
4. Agency or laboratory has no authority to stop the Work.

~~I.~~ ~~Testing and employment of an Owner's independent testing firm or laboratory shall not relieve Contractor of obligation to perform Work in accordance with requirements of Contract Documents.~~

~~J.H.~~ Re-testing or re-inspection required because of non-conformance to specified requirements shall be performed by same ~~Owner's~~ independent testing firm on instructions by Engineer or Construction Manager. Payment for re-testing or re-inspection will be charged to Contractor by deducting testing charges from Contract Sum/Price.

~~K.I.~~ The ~~Owner's~~ independent testing firm responsibilities will include:

1. Test samples of mixes submitted by Contractor.
2. Provide qualified personnel at site. Cooperate with Engineer, Construction Manager, and Contractor in performance of services.
3. Perform specified sampling and testing of products in accordance with specified standards.
4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
5. Promptly notify Engineer, Construction Manager, and Contractor of observed irregularities or non-conformance of Work or products.
6. Perform additional tests required by Engineer or Construction Manager.
7. Attend preconstruction meetings and progress meetings.

~~L.J.~~ ~~Owner's~~ the independent testing firm individual test reports: After each test, ~~Owner's~~ the independent testing firm will promptly submit electronically and three hard copies of report to Engineer, to Construction Manager, and to Contractor. When requested by Engineer or Construction Manager, the Owner's independent testing firm will provide interpretation of test results. Include the following:

1. Date issued.
2. Project title and number.
3. Name of inspector.
4. Date and time of sampling or inspection.
5. Identification of product and specifications section.
6. Location in Project.
7. Type of inspection or test.
8. Date of test.
9. Certified test results stamped and signed by a registered Engineer in the State of California.
10. Summary of conformance with Contract Documents.

~~M.K.~~ Owner's independent testing firm will provide monthly report of certification to identify all work performed for special inspections and other contract requirements on this project. The following certified monthly report at a minimum will include but not limited to:

1. Results of testing.
2. Testing logs.
3. Outstanding deficiencies.
4. Various statistical data.
5. Testing curves (up to 4 types) as required by the Engineer.

1.09 CONTRACTOR'S RESPONSIBILITIES

- A. Cooperate with Owner's independent testing firm or laboratory personnel and provide access to construction and manufacturing operations.
- B. Secure and deliver to Owner's independent testing firm or laboratory adequate quantities of representative samples of materials proposed to be used and which require testing.
- C. Provide to Owner's independent testing firm or laboratory and Engineer preliminary mix design proposed to be used for concrete, and other materials mixes which require control by testing laboratory.
- D. Furnish electronically and 5 hard copies of product test reports.
- E. Furnish incidental labor and facilities:
 1. To provide access to construction to be tested.
 2. To obtain and handle samples at Work site or at source of product to be tested.
 3. To facilitate inspections and tests.
 4. For storage and curing of test samples.
- F. Notify Owner's independent testing firm or laboratory 48 hours in advance of when observations, inspections and testing are needed for laboratory to schedule and perform in accordance with their notice of response time.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

^{AD2} Addendum No. 2

SECTION 01455

SPECIAL TESTS AND INSPECTIONS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: This Section describes the requirements for providing special tests and inspections.
- B. Related section:
 - 1. Section 01450 - Quality Control.

1.02 REFERENCES

- A. ASTM International (ASTM):
 - 1. C140 - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
 - 2. C270 - Standard Specification for Mortar for Unit Masonry.
 - 3. C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
 - 4. C1019 - Standard Test Method for Sampling and Testing Grout.
 - 5. C1314 - Standard Test Method for Compressive Strength of Masonry Prisms.
- B. California Building Code (CBC).

1.03 DESCRIPTION

- A. This Section describes special tests and inspections of structural assemblies and components to be performed in compliance with CBC.
- B. These special tests and inspections are in addition to the requirements specified in Section 01450, and by the individual Sections.
- C. The Construction Manager will employ 1 or more inspectors who will provide special inspections during construction.

1.04 DEFINITIONS

- A. SPECIAL INSPECTION: Inspection of the materials, installation, fabrication, erection, or placement of components and connections requiring special expertise to ensure compliance with approved construction documents and referenced standards.
- B. SPECIAL INSPECTION, CONTINUOUS: The full-time observation of work requiring special inspection by an approved special inspector who is present in the area where the work is being performed.

- C. SPECIAL INSPECTION, PERIODIC: The part-time or intermittent observation of work requiring special inspection by an approved special inspector who is present in the area where the work is being performed and at the completion of the work.
- D. STRUCTURAL OBSERVATION: The visual observation of the structural system by a registered design professional for general conformance to the approved construction documents at significant construction stages and at completion of the structural system.

1.05 SPECIAL INSPECTION

- A. The Construction Manager will employ 1 or more inspectors who will provide special inspections during construction.
- B. Duties of Special Inspector:
 - 1. General: Required duties of the Special Inspector are described in CBC.
- C. Special inspections shall not be construed as fulfilling the requirements for structural observations.

1.06 TESTS

- A. Selection of the material required to be tested shall be by the Owner's Testing Laboratory and not the Contractor.

1.07 STRUCTURAL OBSERVATION

- A. The Construction Manager will employ 1 or more registered design professionals who will provide structural observation during construction of the Flow Control Vault, Flow Meter Vault, Harding Drain Bypass Pump Station Generator Slab, equipment anchorage, and all other locations required by IBC code.^{AD2}
 - 1. The registered design professional shall be a civil or structural engineer currently licensed as such in the state of California and regularly engaged in the structural design of structures equivalent or similar to those shown on the Drawings.
- B. Structural observations shall not be construed as fulfilling the requirements for special inspections

1.08 SPECIAL TESTING AND INSPECTIONS

- A. Testing laboratory: Special tests will be performed by the Owner's testing laboratory as specified in Section 01450.
- B. Owner reserves the right to positive material identification tests.
 - 1. Contractor must make materials available for testing.
- C. The following types of work require special inspection as described in CBC, Refer to the following verification, testing and inspection schedules.
 - 1. Appendix A, Cast-In-Place Concrete Special Inspection Schedule.
 - 2. Appendix B, Soils Verification And Inspection Schedule.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 SCHEDULE

- A. The Contractor shall allow time necessary for Special Inspections as listed above.
- B. Sufficient notice shall be given so that the Special Inspections can be performed. This includes time for off-site Special Inspectors to plan the inspection and travel to site.

3.02 PROCEDURE

- A. The Special Inspector will immediately notify the Construction Manager of any corrections required and follow notification with appropriate documentation.
- B. The Contractor shall not proceed until the work is satisfactory to the Engineer or Construction Manager.

END OF SECTION

APPENDIX A
CAST-IN-PLACE CONCRETE SPECIAL INSPECTION SCHEDULE

Verification and Inspection	Reference Standard	Frequency of Inspection	
		Continuous During Task Listed	Periodic During Task Listed
1. Inspect of reinforcing steel, and verify placement.	ACI 318 Ch. 20, 25.2, 25.3, 26.5.1-26.5.3	–	X
2. Reinforcing bar welding: a. Verify weldability of reinforcing bars others than ASTM A70. b. Inspect single-pass fillet welds, maximum 5/16". c. Inspect all other welds.	AWS D1.4 ACI 318: 26.5.4	– – –	X X X
3. Inspect anchors cast in concrete.	ACI 318:17.8.2	–	X
4. Inspect anchors post-installed in hardened concrete members. a. Adhesive anchors installed in horizontally or upwardly inclined orientations to resist sustained tension loads. Verify weldability of reinforcing bars others than ASTM A706; b. Mechanical anchors and adhesive anchors not defined in 4.a.	ACI 318:17.8.2.4 ACI 318:17.8.2	X	X
5. Verifying use of required design mix.	ACI 318: Ch. 19, 26.4.3, 26.4.4	–	X
6. Prior to concrete placement, fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete.	ASTM C172 ASTM C31 ACI 318: 26.4.5, 26.12	X	–
7. Inspect of concrete placement for proper application techniques.	ACI 318: 26.4.5	X	–
8. Verify maintenance of specified curing temperature and techniques.	ACI 318: 26.4.7-26.4.9	–	X
9. Inspect erection of precast concrete members.	ACI 318: 26.8	–	X
10. Inspect formwork for shape, location, and dimensions of the concrete being formed.	ACI 318: 26.10.1(b)	–	X

APPENDIX B
SOILS VERIFICATION AND INSPECTION SCHEDULE

Verification and Inspection	Frequency of Inspection	
	Continuous During Task Listed	Periodic During Task Listed
1. Verify materials below footings are adequate to achieve the design bearing capacity.	–	X
2. Verify excavations are extended to proper depth and have reached proper material.	–	X
3. Perform classification and testing of controlled fill materials.	–	X
4. Verify use of proper materials, densities, and lift thicknesses during placement and compaction of controlled fill.	X	–
5. Prior to placement of controlled fill, observe subgrade and verify that site has been prepared properly.	–	X

APPENDIX C
OTHER SPECIAL INSPECTION SCHEDULE

Verification and Inspection	Reference Standard	Frequency of Inspection	
		Continuous During Task Listed	Periodic During Task Listed
1. Piling, drilled piers, and caissons.		x	-

^{AD2} Addendum No. 2

SECTION 01738

SELECTIVE ALTERATIONS AND DEMOLITION

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Cutting or modifying of existing and new work.
 - 2. Partial demolition of structures.
- B. Related sections:
 - 1. Section 01140 - Work Restrictions.
 - 2. Section 01330 - Submittal Procedures.
 - 3. Section 02300 - Earthwork.

1.02 REFERENCES

- A. American National Standards Institute (ANSI):
 - 1. A10.6 - Safety and Health Program Requirements for Demolition Operations.
- B. International Concrete Repair Institute (ICRI):
 - 1. Guideline No. 310.2R - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair.
 - 2. Guideline No. 310.3R - Guide for the Preparation of Concrete Surfaces for Repair Using Hydrodemolition Methods.

1.03 DEFINITIONS

- A. Chipping hammer: A hand-operated electrical or pneumatic demolition device for removal of hardened concrete or masonry materials having a weight of less than 15 pounds and an impact frequency of greater than 2,000 blows/minute.
- B. Concrete breaker: A hand-operated electrical or pneumatic demolition device for removal of hardened concrete or masonry materials having a weight greater or impact frequency less than the limits defined for a chipping hammer.
- C. Coring equipment: Non-impact rotary drill with diamond cutting edges.
- D. Heavy abrasive blast: Cleaning procedure by which various abrasives materials, or steel shot, are forcibly propelled by high pressure against a surface to remove loose material and produce a concrete surface roughened to ICRI Surface Profile CSP-7, or higher, as specified in ICRI 301.3R.

1.04 DESCRIPTION OF WORK

- A. The work includes partial demolition, cutting, and modifying of existing facilities, utilities, and/or structures.

- B. These facilities may be occupied and/or operational. Satisfactory completion of the work will require that the Contractor plan activities carefully to work around unavoidable obstacles and to maintain overall stability of structures and structural elements. It will further require restoration of existing facilities, utilities, and structures that are to remain in place and that are damaged by demolition or removal operations.

1.05 SUBMITTALS

- A. General:
 - 1. Submit specified in Section 01330.
- B. Shop drawings: Include:
 - 1. The location of all embedded items shall be documented using diagrams and/or other media that clearly show dimensions and locations of existing structural elements, existing embedded items and any new embedded items and their relationship to each other.
- C. Submittals for information only:
 - 1. Permits and notices authorizing demolition.
 - 2. Certificates of severance of utility services.
 - 3. Permit for transport and disposal of debris.
 - 4. Selective Demolition Plan.
- D. Quality assurance submittals:
 - 1. Qualifications of non-destructive testing agency/agencies.
- E. Project record documents:
- F. Drawings and/or other media documenting locations of service lines and capped utilities.

1.06 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Assign relocation, removal, cutting, coring and patching to trades and workers qualified to perform the Work in manner that causes the least damage and that provides means of returning surfaces to an appearance at least equal to that of the surrounding areas unaffected by the Work.
 - 2. Non-destructive testing agencies: Minimum of 5 years' experience performing non-destructive testing for location of steel reinforcement in existing concrete under conditions similar to that required for this Work.

1.07 SEQUENCING

- A. Perform Work in sequences and within times specified in Section 01140.
- B. If the facility or utility to be modified cannot be removed from service, perform the Work while the facility is in operation using procedures and equipment that do not jeopardize operation or materially reduce the efficiency of that facility.

- C. Coordinate the Work with operation of the facility:
 - 1. Do not begin alterations of designated portions of the Work until specific permission for activities in each area has been granted by Owner in writing.
 - 2. Complete Work as quickly and with as little delay as possible.
- D. Operational functions of the facility that are required to be performed to facilitate the Work will be performed by facility personnel only.
- E. Owner will cooperate in every way practicable to assist in expediting the Work.
- F. When necessary for the proper operation or maintenance of portions of the facility, reschedule operations so the Work will not conflict with required operations or maintenance.

1.08 REGULATORY REQUIREMENTS

- A. Dispose of debris in accordance with governing regulatory agencies.
- B. Comply with applicable air pollution control regulations.
- C. Obtain permits for building demolition, transportation of debris to disposal site and dust control.

1.09 PROJECT CONDITIONS

- A. Do not interfere with use of adjacent structures and elements of the facility not subject to the Work described in this Section. Maintain free and safe passage to and from such facilities.
- B. Provide erect and maintain barricades, lighting, guardrails, and protective devices as required to protect building occupants, general public, workers, and adjoining property:
 - 1. Do not close or obstruct roadways without permits.
 - 2. Conduct operations with minimum interference to public or private roadways.
- C. Prevent movement, settlement, or collapse of structures adjacent services, sidewalks, driveways and trees:
 - 1. Provide and place bracing or shoring.
 - 2. Cease operations and notify Engineer and Construction Manager immediately when safety of structures appears to be endangered. Take precautions to properly support structure. Do not resume operations until safety is restored.
 - 3. Assume liability for movement, settlement, or collapse. Promptly repair damage.
- D. Arrange and pay for capping and plugging utility services. Disconnect and stub off.
 - 1. Notify affected utility company in advance and obtain approval before starting demolition.
 - 2. Place markers to indicate location of disconnected services.
- E. Unknown conditions:
 - 1. The drawings may not represent all conditions at the site and adjoining areas. Compare actual conditions with drawings before commencement of Work.

2. Existing utilities and drainage systems below grade are located from existing documents and from surface facilities such as manholes, valve boxes, area drains, and other surface fixtures.
3. If existing active services encountered are not indicated or otherwise made known to the Contractor and interfere with the permanent facilities under construction, notify the Engineer and Construction Manager in writing, requesting instructions on their disposition. Take immediate steps to ensure that the service provided is not interrupted, and do not proceed with the Work until written instructions are received from the Construction Manager.

PART 2 PRODUCTS

2.01 SALVAGE MATERIALS

- A. Salvage materials: Materials removed from existing facility.
- B. Coordinate with the designated entity scheduled to receive salvaged material to confirm the delivery location and timing are acceptable to the designated entity.
- C. Materials designated for salvage:
 1. 42-inch blind flange at the tie-in at the Modesto Effluent Pump Station. Provide flange to the City of Modesto Jennings Treatment Plant as indicated on the drawings.
 2. 30-inch blind flange at the tie-in at the Turlock Harding Drain Outfall Site. Provide flange to the City of Turlock Regional Water Quality Control Facility located at 901 South Walnut Road, Turlock, CA 95380.
 3. At the Contractor's option, excavated native soil, if free from organic material and hazardous material, may be disposed of at the Modesto Jennings Treatment Plant as shown on the drawings. Contractor shall stockpile its disposed soil adjacent to existing soil stockpile. Stockpiling shall occur on a routine basis, not once at the end of the project. ^{AD2}
 4. At the Contractor's option, asphalt grindings, if free from organic material and hazardous material, may be disposed of at the Modesto Jennings Treatment Plant as shown on the drawings. Contractor shall stockpile its disposed soil adjacent to existing soil stockpile. Stockpiling shall occur on a routine basis, not once at the end of the project. ^{AD2}
- D. Handling and storage:
 1. Prevent damage to salvaged materials during removal, handling, and transportation of salvaged materials.
- E. Pay costs associated with salvaging materials, including handling, transporting, and off-loading.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Prior to beginning selective demolition operations, perform a thorough inspection of the facility and site, and report to the Engineer and Construction Manager defects and structural damage to or deterioration of existing construction to remain.

- B. Examine areas affected by the Work and verify the following conditions prior to commencing demolition:
 - 1. Disconnection of utilities as required.
 - 2. That utilities serving occupied or active portions of surrounding facilities will not be disturbed, except as otherwise indicated.
- C. If unsatisfactory conditions exist, notify the Engineer and Construction Manager, and do not begin demolition operations until such conditions have been corrected.

END OF SECTION

^{AD2} Addendum No. 2

SECTION 02240

DEWATERING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Installation and maintenance of dewatering systems.
 - 2. Disposal of water entering excavation or other parts of the work.
- B. Related sections:
 - 1. Section 03300 - Cast-in-Place Concrete.
 - 2. Section 03600 - Grouting.
 - 3. Section 02318 - Trenching

1.02 REFERENCES

- A. National Electrical Manufacturers Association (NEMA):
 - 1. 250 – Enclosures for Electrical Equipment (1000 V Maximum).
- B. The City of Turlock has installed a groundwater monitoring well along the pipeline alignment with a vibrating wire piezometer - see Appendix O in Volume 4 of the Contract Documents.
- C. The City of Modesto monitors groundwater wells in the vicinity of the Project - see Appendix N in Volume 4 of the Contract Documents.
- D. The geotechnical report includes groundwater elevations at the time geotechnical boring were completed - see Section 00800-SC-5.03 for information on how to obtain a PDF copy.
- E. Available information on groundwater quality is included in Appendix P in Volume 4 of the Contract Documents.

1.03 DEFINITIONS

- A. NEMA Type 4X enclosure in accordance with NEMA 250.

1.04 SYSTEM DESCRIPTION

- A. Design requirements:
 - 1. Contractor shall keep excavations reasonably free from groundwater and any other water. Draw down static groundwater level to minimum of 1 foot below anticipated bottom of excavations and trenches before excavation begins.
 - 2. Dewatering design analysis shall include the following:
 - a. Evaluation of anticipated subsurface conditions.
 - b. Required well spacing.
 - c. Diameter of wells.
 - d. Depth to screen, screen height, and mesh size.

- e. Backfill and filter pack.
 - f. Pump size.
 - g. Drawdown duration.
 - h. Drawdown and steady state flow rates.
 - i. Plans for de-silting of groundwater before discharge.
 - j. Expected settlements.
3. Include water drawdown curves in dewatering calculations.
 4. Coordinate dewatering design with excavation and shoring design. Excavation and shoring design shall consider changes in groundwater conditions and associated earth pressures.
 5. Do not place concrete or masonry foundations or concrete slabs in water. Do not allow water to rise over these elements until concrete or mortar has set for at least 24 hours.
 6. Maintain operation of dewatering system until complete structure and/or pipeline -- including walls, slabs, beams, struts, and other structural elements -
- has been constructed; concrete has attained its specified compressive strength; and backfill has been completed to finished grade.
 7. Provide standby power to ensure continuous dewatering in case of power failure.
- B. Dewatering shored excavations for construction of structures and/or pipelines:
1. Dewatering from within shoring is acceptable if it does not interfere with structure construction.
 - a. Obtain written permission from Engineer before locating wells, well points, or drain lines for dewatering within the limits of a structure's foundation.
 2. Use impermeable shoring system to minimize lowering of groundwater outside shoring at the micro-tunnel shaft locations. The Contractor shall lower the groundwater as required by this specification during the pipeline installation. Impermeable shoring is not required for the pipeline installation. ^{AD2}
 3. Extend impermeable shoring below bottom of excavation sufficient amount to:
 - a. Minimize lowering of groundwater outside shoring.
 - b. Prevent unstable excavation due to piping and heave.
 4. To minimize settlement outside shoring due to dewatering, do not lower groundwater outside shoring more than 1 foot. Provide groundwater recharge if required to maintain this groundwater elevation outside of shoring.
 5. Provide monitoring wells located outside shoring for monitoring groundwater elevation.
- C. Locate dewatering facilities where they will not interfere with utilities and construction work to be performed by others.
- D. Generator Noise: Generators shall not be so loud as to upset residents living near the project. Locate generators at sufficient distances from residents and/or use generators that produce low levels of noise. Generators shall not produce sound with a level more than 85 decibels at the edge of the allowable work area.
- E. Discharge of dewatering water:
1. Discharge of dewatering water shall be to locations shown in the Drawings. Dewatering water shall be discharged to either the City of Modesto Jennings

Treatment Plant or to the identified Private Properties and shall have the following requirements:

- a. City of Modesto Jennings Treatment Plant (Plant):
 - 1) Notify Plant staff a minimum of 2 months prior to planning to discharge to the Plant.
 - 2) There is not a time of year restriction for discharging to the Plant.
 - 3) Prior to discharge, sediment and silt shall be removed from the dewatering water through the use of a settling tank or similar method to achieve water quality with a maximum turbidity of 15 NTUs.
 - 4) Discharge to the Plant shall be to the Irrigation Forebay or to the Plant's irrigation system. Contractor shall connect to the irrigation system through above ground pipeline blowoff structures shown on the Construction Dewatering Drawing.
 - a) Contractor shall notify Construction Manager and City of Modesto a minimum 1 week prior to each connection of the Plant irrigation system and coordinate work with the Construction Manager and City of Modesto.
 - b) The static head of the irrigation pipeline shall be field verified by the Contractor, and is approximately 30 feet. The connection to the irrigation pipeline shall include a backflow preventer to prevent the irrigation system from flowing into the dewatering system.
 - 5) Upon completion of dewatering operations, Contractor shall remove dewatering piping and restore Plant facilities to pre-project conditions.
- b. Private Properties
 - 1) Turlock has reached out to all the property owners along the project alignment and has secured agreements with two private property owners (Silva and Mendes) for disposal of dewatering water to their properties.
 - 2) The terms, conditions, available acreage, seasonal requirements, and payment requirements of dewatering disposal to each private property are different. Each of the private property owner agreements is titled, "Agreement to Take Delivery of Trench Dewatering Water, North Valley Regional Recycled Water Project" and located in Volume 4 of the Contract Documents. Contractor shall comply with all the terms of these agreements.
 - 3) The Contractor, at the Contractor's sole option, shall elect which private properties to use for dewatering water disposal during bidding. The Contractor may elect not to use the private properties for dewatering water disposal.
 - 4) If the Contractor elects to use private properties for groundwater disposal, the Contractor's bid price shall include the total cost of the "Payment Terms" for the private properties.
 - 5) After bidding, the Contractor shall not be permitted to request use of a private property for dewatering water disposal that was not included in the bid price.
 - 6) Regulatory requirements:
 - a) Discharging dewatering water to private properties requires the Contractor to comply with the State Water Resources Control Board Water Quality Order No. 2003-0003-DWQ, Statewide General Waste Discharge Requirements (WDRs) for Discharges

to Land with a Low Threat to Water Quality, included in Volume 4 of the Contract Documents.

- b) This project is considered a small/temporary dewatering project.
- c) Prior to discharging dewatering water to private properties the Contractor shall obtain approval from the Central Valley Regional Water Quality Control Board.
- d) The following a general steps the Contractor shall follow to obtain approval:
- e) Complete and sign Form 200 and a Notice of Intent (Attachment 3 of the General Order). Include a letter with the following information:
 - (1) Project location with APNs or map showing the project location, staging area, and discharge areas
 - (2) Documentation of the property owner's permission to discharge to land, if applicable.
 - (3) Approximate duration of the discharge (a one-time event in number of weeks or months, or if on-going, etc.)
 - (4) Approximate or average volume of water to be discharged per day or for the duration of the project (gpm or gpd)
 - (5) Approximate acreage of discharge and brief description of the discharge area (landscaped, open field, cropped land, etc.), how the discharged water will be used (irrigation, dust control, etc.), and provisions that will be in place to prevent off-site discharge and discharge into surface water bodies.
 - (6) Available information on local groundwater such as approximate depth, flow direction, water quality information, uses, etc
- f) Submit to Scott Armstrong P.G., C.H.G., Senior Engineering Geologist, Central Valley Regional Water Quality Control Board, Waste Discharge to Land Permitting Unit, 11020 Sun Center Drive, Suite 200, Rancho Cordova, California 95670 (Direct: 916-464-4616).
- g) Include the fee (approximately \$3,000) paid by Contractor. Note a similar fee for the second calendar year will likely be required to be paid by the Contractor.
- h) Contractor shall complete a monitoring plan and monitor per Order No. 2003-0003-DWQ.
- i) When discharge is complete, Contractor shall submit a notice of termination of discharge to the Central Valley Regional Water Quality Control Board.
- j) For bid purposes, Contractor shall assume the infiltration rate of dewatering water applied to the properties is 0.13 in/hr, during dry weather conditions.

1.05 SUBMITTALS

A. Dewatering plan:

- 1. Dewatering design analysis and calculations signed by the engineer.
- 2. Required permits.
- 3. Arrangement, location, and depths of dewatering system components including the type of generator and noise produced by the generator.

4. Type and sizes of filters and a description of how sediment and silt shall be removed.
 5. Detailed drawings of the dewatering facility layout (including all dewatering related equipment such as pumps, standby generators, fuel cells, and other equipment) and connections to the Plant and private property discharge locations (if private properties are planned to be used). Drawings shall include connection details for the dewatering discharge location.
 6. Identify proposed alignment, support, and protection for discharge pipe. Identify location of discharge and provide details for that location.
- B. Well construction logs. Include:
1. Descriptions of actual materials encountered, categorized in accordance with Unified Soil Classification System.
 2. Construction details.
 3. Well development procedures and results.
 4. Deviations from original design.
- C. Flowmeter:
1. Product information on flowmeter and chart recorder.
 2. Recent flowmeter calibration documentation.
 3. Chart(s) from flowmeter chart recorder.
- D. Water Quality:
1. If the 42-inch project pipeline as a conveyance facility for dewatering water, submit bi-weekly water quality analysis data confirming the dewatering water meets the water quality requirements.
- E. Qualifications:
1. Dewatering contractor.
 2. Dewatering design engineer.
 3. Testing laboratory.

1.06 QUALITY ASSURANCE

- A. Dewatering plan and dewatering system analysis:
1. Prepared by a qualified Civil Engineer, licensed in the state where the Project is located.
 - a. The dewatering design engineer shall have at least 10 years of experience in designing similar systems.
- B. Dewatering Contractor shall have at least 10 years of experience in installing similar systems.
- C. Testing laboratory shall meet discharge permit testing laboratory qualifications.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Flowmeter and chart recorder: One of the following or equal:
1. Badger Turbo Series Meter with totalizer.

PART 3 EXECUTION

3.01 INSTALLATION

- A. During construction, provide and maintain ample means and devices to promptly remove and properly dispose of water entering excavation or other parts of the work, whether water is surface water or underground water.
- B. Keep excavations reasonably free of water.
- C. Make provisions to maintain continuous dewatering:
 - 1. Provide standby power to maintain dewatering during power outages and interruptions.
 - 2. Provide 24-hour monitoring by personnel skilled in operation and maintenance of the system, and capable of providing or obtaining work required to maintain system operation.
- D. Intercept and divert precipitation and surface water away from excavations. Use dikes, curb walls, ditches, pipes, sumps, or other means acceptable to Engineer.
- E. Disposal of water:
 - 1. Dispose of water from the work in suitable manner without damage to adjacent property.
 - 2. Do not drain water into work built or under construction.
 - 3. Dispose of water in such manner that it will not be a menace to public health or safety.
- F. Wells, well points, and drain lines for dewatering:
 - 1. Provide after receiving Engineer's written acceptance.
 - 2. Fill dewatering wells, pipes, and french drains to be left in place within structure foundation limits with Class "C" concrete as specified in Section 03300 or grout as specified in Section 03600.

3.02 CONSTRUCTION

- A. Prior to release of groundwater to its static level: Confirm that:
 - 1. All groundwater pressure relief devices for structure are fully operational.
 - 2. Construction of structure is complete and concrete has reached its specified compressive strength.
 - 3. Backfill of structure is complete.
- B. Control release of groundwater to its static level to prevent disturbance of natural foundation soils or compacted backfills and fills and to prevent flotation or movement of structures, pipelines, or other facilities.

3.03 FIELD QUALITY CONTROL

- A. Flowmeter and chart recorder:
 - 1. Provide flowmeter and continuous 24-hour chart recorder for recording dewatering flow.
 - 2. Maintain meter recorder and provide continuous reading charts with minimum capacity of 24 hours each.
 - 3. Calibrate flowmeter and recorder device to provide accuracy within 5 percent.

4. Submit written evidence of calibration of meter and recorder signed by a Professional Engineer registered in California.
5. Portable recorder (bench mount), dual scale, and mounted in NEMA Type 4X enclosure with transparent plastic door and latch. Operate unit off 115-volts, 60-Hertz power supply.
6. Submit readings to the Owner on a weekly basis.

END OF SECTION

^{AD2} Addendum No. 2

SECTION 02261

SHAFT EXCAVATION AND SUPPORT FOR TRENCHLESS PIPELINE INSTALLATION

PART 1 GENERAL

1.01 SUMMARY

- A. This Section provides the minimum requirements and acceptable construction methods for excavation and support of the shafts for the trenchless pipeline installations. Refer to Section 02260 for all other excavation support and protection.
- B. The Contractor shall design, furnish, install, and maintain a system of temporary supports, including all bracing and associated items, to retain excavations in a safe manner, to control ground movements and to control groundwater inflows. Upon completion of the required excavation and pipe installation, the Contractor shall remove the support system as Specified herein, and shall backfill the excavations with aggregate base course ^{AD2} in accordance with Section 02300 or controlled low strength material in accordance with Section 02312. ^{AD2}
- C. The work shall include site grading; temporary access road construction where needed; safety fencing and signage; protection of utilities; construction staging areas; design and construction of shaft excavations and excavation support systems; material disposal; ground improvement where necessary and where shown on the Drawings; control and disposal of groundwater (in locations where dewatering is allowed), infiltrating groundwater, surface water, and construction water; removal, backfilling and abandoning shafts; and site restoration.
- D. The Contractor shall have sole responsibility for selection of shaft types (subject to the requirements of this Specification), construction methods, and exact sizing and locations of the excavations to accommodate shoring, bracing, and pipe installation to the specified lines, grades and tolerances. The shafts shall be sized to facilitate construction of all facilities shown on the Drawings.
- E. Depending on crossing location, field conditions, and Contractor's means and methods, acceptable shaft types may include: ~~soldier piles and lagging, slide rail systems,~~ ^{AD2} interlocking steel sheetpiles, secant pile/CSM shafts, grouted corrugated metal pipe casing constructed by large diameter auger drilling, or other Contractor-proposed construction methods for jacking/receiving shafts, subject to review and written approval by the Engineer. ~~Where high groundwater levels are present and/or potentially unstable soil conditions, soldier pile and lagging and slide rail systems shall not be allowed.~~ ^{AD2} The following shaft construction methods shall not be allowed at any crossing: trench boxes, speed shores, soldier pile and lagging, ~~or~~ ^{AD2} sloped open excavations, or other non-water tight applications ^{AD2}.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02233 - Settlement Monitoring.
- B. Section 02300 - Earthwork.
- C. Section 02240 - Dewatering.

- D. Section 02260 - Excavation Support and Protection.
- E. Section 02345 - Microtunneling.
- F. Section 03360 - Contact Grouting.

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. The publications listed below form a part of this Specification to the extent referenced. Where conflicts between these Specifications and the referenced specification, code, or standard occur, the more restrictive specification shall govern. The latest edition available on the date of issue of Contract Documents shall be used.
- B. Commercial Standards:
 - 1. AISC - Manual of Steel Construction.
 - 2. ASTM A36 - Standard Specification for Carbon Structural Steel.
 - 3. ANSI/AWS - D1.1, Structural Welding Code.
 - 4. ASTM A328 - Standard Specification for Steel Sheet Piling.
 - 5. Occupational Safety and Health Administration (OSHA) Regulations, 29 CFR Part 1926 Subpart P - Excavations and Subpart S - Underground Construction.
- C. Standard Specifications and Guidelines:
 - 1. ASCE Standard Design and Construction Guidelines for Microtunneling, ASCE/CI 36-15.

1.04 DEFINITIONS

- A. Auger-Drilled Shaft: A watertight excavation support system composed of a corrugated metal pipe (CMP) casing grouted in place inside an auger drilled excavation. A large diameter auger drill rig is used to excavate a shaft slightly larger than the required inner diameter. During drilling, the shaft is kept filled with high density, high viscosity polymer fluid to a level which prevents caving, sloughing, or collapse of the excavation. When the drilling is complete, a prefabricated CMP casing of the required diameter is lowered into the polymer-filled excavation. A concrete plug is placed at the bottom of the shaft by tremie, of sufficient thickness to prevent groundwater inflows and to resist buoyant uplift when the shaft is dewatered. Grout is placed by tremie between the outside wall of the CMP and the excavation wall. When the concrete and grout have cured, the fluid can be pumped out of the shaft.
- B. Cutter Soil Mixed (CSM) Shaft: A shaft that is formed by overlapping panels of soilcrete that have been created by mixing native soil with self-curing cement-based slurries. The panels are excavated by driving a modified trench cutter tool into the ground that mixes the soils with a drilling fluid. Once the cutter has reached the appropriate depth, the cutter head is retracted and cement is mixed into the soil slurry to create the soilcrete panel. Cutter soil mixed shafts may be round or rectangular, using integral steel reinforcement or wales as necessary to support the piles. Cutter soil mixed shafts can be constructed to provide a watertight shoring system.
- C. Limited Disruption Shaft Construction Methods: Limited disruption methods for shaft construction allowed on this project include hydraulically-pressed sheetpiles, auger-drilled shafts, and secant pile/CSM shafts. Limited disruption methods shall limit

ground vibrations to a peak particle velocity of 0.25 in/sec at the nearest property line or structure of concern. Additionally, conventional percussive or vibratory methods for installing sheetpiles are not considered Limited Disruption Methods and shall not be used where limited disruption methods are required.

- D. Secant Pile Shaft: A shaft that is formed by overlapping concrete piles. The concrete is placed using the tremie method, in bored holes that are stabilized with drilling fluid and/or temporary casing. Secant pile shafts may be round or rectangular, using integral steel reinforcement or wales as necessary to support the piles. Secant pile shafts can be constructed to provide a watertight shoring system, typically combined with the use of a concrete tremie bottom slab.
- E. Sheetpile Shaft: A watertight excavation support system consisting of interlocking steel sheetpiles driven, vibrated, or hydraulically-pressed into place, with a concrete working slab and/or tremie slab designed to prevent groundwater inflows, heave, or shaft uplift.
- F. Soft Eye: A portion of cementitious shaft wall composed of “soft” unreinforced concrete, soilcrete, or other material that is excavatable by the tunneling equipment. Soft eyes are used to facilitate exit of the tunneling shield from the jacking shaft and entry at the reception shaft.
- G. Soldier Pile and Lagging Shaft: A non-watertight excavation support system composed of vertical steel H-Piles, wales, struts, and lagging. The vertical H-Piles extend from ground surface to a sufficient depth below the final excavation depth to provide adequate resistance against earth pressures. Lagging, consisting of wooden boards or steel sheets is inserted between the flanges of the adjacent H-beams to support the excavation and prevent soil from sloughing or caving into the excavation. Wales are horizontal support beams installed and welded to the vertical soldier piles to stiffen the support system and are sized and installed at a vertical spacing to safely support external earth loads. The shaft bottom is covered with a concrete slab with one or more sumps.
- H. Tunnel Portal Stabilization: Where the new tunneled pipelines enter or exit a shaft excavation, the Contractor shall stabilize the portal to prevent soil or groundwater inflows into the shaft that may lead to settlement around the shaft or flooding of the excavation. Portal stabilization may be accomplished using ground improvement (such as jet grouting), double sheeting methods combined with contact grouting (guillotine method), or may be integral to the shaft construction method (as for secant pile/CSM shafts). Portal stabilization is required at all shafts.
- I. Watertight Shafts: Watertight shafts for this project include fully-interlocked steel sheetpiles, auger-drilled shafts, and secant pile/CSM shafts. These shaft types shall be used in conjunction with groundwater cutoffs and/or tremie slabs to provide dry, stable work areas below the water table. At locations where watertight shafts are required, the Contractor may not use pumping systems to lower the surrounding groundwater level.

1.05 DESIGN CRITERIA

- A. The Contractor shall have sole responsibility for selection of shaft types, construction methods, and shaft excavation sizes to complete the Work, meeting the requirements of these Specifications. The size of the shafts shall be adequate to

complete all trenchless construction as described in the Contractor's submittals, and to construct all pipelines and structures shown on the Drawings. Shaft sizes shown on the drawings are approximate and the Contractor shall size and design the required shaft. Shafts shall not be located closer than 3' to the edge of roadway pavement and shall be located within the right-of-way. Shafts shall not interfere with existing utilities.

- B. Depending on crossing location, acceptable shaft types are specified in Part 1.01.E of this Section.
- C. Excavation support systems shall be designed and stamped by a Civil or Structural Engineer registered in the State of California who has a minimum of ten (10) years of experience in the design of soil retaining structures.
- D. Shafts shall be designed to provide a continuous, stable, dry excavation support system that shall support all earth and unrelieved groundwater pressures, bottom heave pressures, equipment, applicable traffic, and construction loads and pressures (i.e. annulus grouting pressures) and other surcharge loads in accordance with the site conditions, the conditions described in the Geotechnical Report, the conditions anticipated by the Contractor, and other requirements described in these Drawings and Specifications.
- E. Shafts shall be designed to withstand the full hydrostatic head of groundwater or shall include provisions for dewatering to completely remove groundwater loading (in areas where dewatering is allowed). The Contractor shall perform dewatering operations in accordance with the provisions of Section 02240 - Dewatering and the Water Control for Shafts and Tunnels part of this Section.
- F. Design excavation support systems in accordance with AISC and ACI code provisions, as applicable.
- G. The shaft design shall allow the safe and expeditious construction of the permanent facilities without excessive movement or settlement of the ground, and in a manner that will prevent damage to, or movement of, any adjacent structures, utilities, or other facilities. Monitor and protect adjacent utilities from horizontal and vertical movements in accordance with Section 02260 - Excavation Support and Protection and Section 02233 - Settlement Monitoring.
- H. The shafts shall be of a size large enough to facilitate all necessary groundwater control, construction operations including the trenchless pipe installation, construction of any structures shown on the Drawings, and pipeline connections to open-cut reaches of the Work.

- I. The Contractor shall ensure that the depth of the shaft excavations allows sufficient vertical clearance for placement of the tremie/working slab and jacking frame at the required elevations to install the pipeline, as shown on the Drawings. Survey of final shaft bottom elevations shall be recorded and submitted.
- J. All shaft components, including external supports shall be within the construction easement or public rights-of-way.
- K. All shaft excavations shall have a concrete floor slab to provide a stable platform to complete the Work. The concrete slab at each excavation shall be designed to protect the excavation invert in accordance with these minimum design criteria:
 - 1. Have a finished concrete slab to seal the shaft from groundwater inflows and to resist uplift of the completed shaft.
 - 2. Be capable of supporting such combined dead and live loads as are required by the Contractor's means and methods.
 - 3. Be capable of resisting design hydrostatic uplift with a minimum safety factor of 1.3, or equipped with a groundwater/pressure relief system to assure a minimum safety factor of 1.3 for reduced hydrostatic uplift pressures.
 - 4. The concrete plug or slab reinforcing may be designed to structurally tie the slab to the shaft walls to take advantage of the shaft dead weight and sidewall friction in resisting uplift due to buoyancy. Alternately, the concrete slab may be designed with a groundwater cutoff and/or adequately designed sump system to control inflows and reduce uplift forces.
- L. The shaft floors shall be designed with a sump to allow removal of any infiltrating groundwater, rainwater, runoff, or construction water that enters the shaft.
- M. The Contractor may install and operate Contractor-designed groundwater pumping systems outside of the shafts, provided that the Contractor obtains necessary permits for handling, treatment, and disposal of groundwater and obtains and complies with permit requirements and local, State, and Federal regulations. Perform all dewatering work in accordance with the provisions of Section 02240 - Dewatering and the Water Control for Shafts and Tunnels part of this Section
- N. Grout: The strength of any grout mixture used outside shaft supports shall be selected to allow the tunneling equipment to efficiently excavate or advance through the grouted material during both launch and retrieval. The tunneling subcontractor shall be consulted to ensure compatibility between the grout strength and tunneling equipment.
- O. The jacking shaft and thrust block shall be designed to provide adequate jacking capacity to resist anticipated jacking forces with a minimum factor of safety of 1.5.
- P. Shafts shall be designed for complete removal of all portions of the shoring, and to accommodate construction of connections and backfill sequences.
- Q. When in use, shafts shall have protective guard rails or fencing surrounding the shaft that complies with OSHA requirements.
- R. Shafts shall be protected during periods of inactivity in a manner which prevents unauthorized entry. Shafts shall have a protective perimeter guard rail installed during use which complies with all OSHA requirements.

~~S. Soldier Pile and Lagging Shafts:~~

- ~~1. Internal supports, including wales, struts, and corner braces, shall be installed sequentially as the shaft is excavated. At no time shall the unsupported excavation depth exceed the Contractor's design location for wales or struts, plus 2 feet, as shown on the Contractor's reviewed and accepted submittals. All internal supports shall be installed within +/- 3 inches of design locations shown on reviewed and accepted submittals.~~
- ~~2. Struts shall be installed and preloaded by jacking to 50 percent of design capacity, before excavation resumes. Steel wedges, or shims, shall be installed and welded in place to lock in preloaded stresses and prevent excessive lateral deformations.~~
- ~~3. Pre-drilling may be required to install soldier piles.~~
- ~~4. Install piles to the tip elevations shown in approved submittals.~~
- ~~5. Provide timber, steel, or precast concrete lagging or sheets of sufficient thickness to withstand lateral earth pressures.~~
- ~~6.1. Install lagging with no vertical or horizontal gaps between adjacent boards or sheets. As installation progresses, backfill the voids between the excavation face and the lagging with sand or pea gravel, or lean grout packed into place. Pack with materials such as hay, burlap, or geotextile fabric where necessary to allow drainage of groundwater without loss of fines due to piping.~~ AD2

~~T.S.~~ Sheetpile Shafts:

1. Steel sheetpiling shall be used only where the existing subsurface conditions are suitable for the installation of sheetpiling, including the use of pre-drilling to loosen the soils, to the full depth of penetration required, and to proper alignment and plumbness, without damage to the sheetpiling or rupture of its interlocks.
2. Fully interlocking steel sheetpiles shall be used to construct the sheetpile shafts.
3. Sheetpile corners shall be installed with interlocks and bulbs properly engaged for full depth of sheetpiles. If interlocks and bulbs cannot be properly engaged for full depth, connections shall be welded continuously to seal all cracks and avoid inflows of groundwater and soils.
4. In anticipated very stiff to hard/dense to very dense ground conditions, pre-drilling is required to achieve efficient installation of the sheetpiles. The Contractor shall use pre-drilling to adequately loosen the soil prior to driving sheetpiles.
5. Sheetpiles shall be installed plumb to within 1 percent of vertical. Sheetpiles that do not meet plumb tolerances will be pulled and reinstalled by Contractor, at no additional cost to the Owner.
6. Internal supports, including wales, struts, and corner braces, shall be installed sequentially as the shaft is excavated. At no time shall the unbraced shoring depth exceed the design spacing of horizontal support members plus 2 feet, as shown on approved submittals. All internal supports shall be installed within +/- 3 inches of design locations shown on approved submittals.
7. All struts shown or required in the Contractor's approved design submittal shall be installed after each level of wales are installed and preloaded by jacking to 50 percent of design capacity, before excavation resumes. Steel wedges, or shims, shall be installed and welded in place to lock in preloaded stresses and prevent excessive lateral deformations.

8. The strength of any grout mixture used behind the steel sheetpiles shall be selected to allow the tunneling equipment to efficiently excavate or advance through the grouted zone during both launch and retrieval.

~~U.T.~~ Cutter Soil Mixed Shafts (CSM):

1. Cutter soil mixed shaft designs, installation equipment, and methods shall be compatible with the conditions anticipated.
2. Individual soilcrete panels shall be installed within a tolerance of 1 percent of true vertical.
3. The following will be considered defects requiring satisfactory repair or replacement:
 - a. Installed panel position does not meet specified vertical tolerances.
 - b. Installed panels provide less than the minimum wall thickness/interlock between panels shown on the Contractor's reviewed and accepted shop drawings.
 - c. Installed panels have less than minimum soilcrete strength required by Contractor's design and reviewed and accepted submittals.
 - d. Installed panels have voids/cavities/honeycombing.

~~V.U.~~ Secant Pile Shafts:

1. Secant pile shaft designs and installation equipment and methods shall be compatible with the conditions anticipated.
2. Individual bore holes shall be completely supported with stabilizing drilling fluid or temporary casing at all times during drilling.
3. Individual secant piles shall be installed within a tolerance of 1 percent of true vertical.
4. The following will be considered defects/defective piles requiring satisfactory repair or replacement:
 - a. Exceeds specified vertical tolerances.
 - b. Less than the minimum wall thickness/interlock between piles shown on the Contractor's reviewed and accepted shop drawings.
 - c. Less than minimum concrete strength required by Contractor's design and submittals.
 - d. Installed columns have voids/cavities/honeycombing.

1.06 WATER CONTROL FOR SHAFTS AND TUNNELS

- A. Provide continuous control of water in shafts and tunnels at all times during the course of construction, including weekends and holidays, and during periods of Work stoppages.
- B. Design, furnish, install, operate, and remove all machinery, appliances, power, and equipment necessary to remove water from tunnels and shafts during construction. Dewater, treat, and dispose of water so as not to cause injury to public or private property or to cause a nuisance or a menace to the public and in accordance with all applicable permit requirements.
- C. Have on hand at all times sufficient pumping equipment and machinery in good working condition for all foreseeable emergencies, including power outages and flooding, and have available at all times competent workers for the continuous and successful operation of the water control and monitoring systems.

- D. The Contractor shall obtain all permits and other documentation necessary to properly discharge or dispose of collected water.
- E. Modify water control systems after installation and while in operation if they cause or threaten to cause damage to adjacent property or to existing buildings, structures, or utilities, and as necessary to ensure satisfactory performance.
- F. Take reasonable precautions necessary to ensure successful operation of water control systems.
- G. Dispose of water under terms, requirements, and restrictions of applicable permits.
- H. Intercept and divert surface drainage away from the Work by use of dikes, curb walls, ditches, sumps, or other means.
- I. Design surface drainage system so as to not cause erosion on or off the site. Surface runoff shall be controlled to prevent entry of water into excavations and shafts.
- J. Do not allow surface water to inundate shaft excavations.
- K. Use water control methods that are appropriate to the ground conditions, described in the Geotechnical Report, the planned construction operations, and requirements of these Contract Documents.
- L. If a large amount of subsurface water drains into an excavation, take immediate steps to control water inflow. Large amounts of inflow requiring immediate control shall be defined as that which adversely affects the Work and/or threatens damage to adjacent structures or facilities.
- M. Design and operate water control system to prevent removal of in situ ground or loosening or softening of in situ ground surrounding the excavation.
- N. Water shall be removed during periods when concrete is being placed, when pipe is being laid, during shaft excavation, and at such other times as is necessary for efficient and safe execution of the Work. If a concrete tremie plug or work slab for shaft construction is used, the plug shall not be subjected to unbalanced hydrostatic pressures until it has obtained compressive strength sufficient to resist uplift pressure.
- O. Facilities shall be removed at the completion of the Work in conformance with regulatory requirements.

1.07 PORTAL STABILIZATION

- A. Contractor shall provide portal stabilization measures at shaft locations for trenchless installations to prevent soil inflows, and to control groundwater inflows during launch and retrieval of the tunneling equipment. The Contractor shall provide portal stabilization at all trenchless shaft penetrations such that no soil and not more than 5 gpm of water enter the shaft when portals are opened for launch or retrieval of the tunneling equipment.

- B. The Contractor may provide portal stabilization using ground improvement methods, guillotine wall (double-wall) methods, methods integral to the shaft construction, or other methods proposed by the Contractor, subject to Engineer's written approval. It is the sole responsibility of the Contractor to choose portal stabilization methods that are appropriate for the ground conditions and shaft types at each shaft location.
- C. The maximum 28-day compressive strength of any grout used or soil-cement created shall not exceed 500 psi. The minimum 24-hour compressive strength shall be at least 10 psi. Additionally, the cured grout or soil-cement shall be of a strength that can be efficiently excavated by the tunneling equipment without damage to the equipment.
- D. Grouting: Where grouting is used for portal stabilization, the Contractor shall perform the Work in accordance with accepted submittals.
- E. Guillotine Wall Method:
 - 1. The guillotine wall shall extend not less than 3 feet beyond the maximum portal dimensions to be opened in the primary shoring system, in all directions.
 - 2. The Contractor shall accomplish this method of stabilization by inserting a set of steel sheetpiles just outside of the primary shoring system. Pre-drilling of the soils may be necessary to install guillotine shoring to the required depths.
 - 3. The Contractor shall inject contact grout between the primary shoring system and the guillotine wall, as necessary, to stabilize the ground between and to seal any voids that will allow groundwater flow into the shaft, before opening tunnel portals.
 - 4. Guillotine sheets shall be completely removed after the tunneling equipment has been advanced through and seated in the shaft seal.
- F. Ground Improvement Method:
 - 1. Choose ground improvement methods that will achieve the required stability for each shaft location.
 - 2. If ground improvement cannot be performed tight against the shoring face, supplemental contact grouting shall be used to achieve control of groundwater inflows.
 - 3. The prism of improved ground shall extend not less than 4 feet beyond the maximum portal dimensions to be opened in the primary shoring system, in all directions. Perform grouting for portal stabilization in accordance with accepted submittals.
- G. Verification of Stability: The Contractor shall stabilize the soils at all tunnel portal locations to prevent the inflow of raveling, running, or flowing soils and to control groundwater inflows. The Contractor shall confirm that the ground has been stabilized to the extent that ground will remain stable without movement of soil or water while the entry/exit location shoring is removed, while the tunneling equipment is being launched or received into a shaft, or during jacking operations. The progressive steps identified below shall be used to confirm suitable stabilization has been achieved for all shaft types and entry/exit locations:
 - 1. After the Contractor believes the ground has been stabilized sufficiently outside a given shaft portal, the Contractor shall demonstrate the stability of the ground by cutting a 6 inch diameter hole in the shoring wall near the center of the bore. If no soil or less than 5 gpm of water enters the shaft, the Contractor may progress to the next demonstration step. If soil or more than

- 5 gallons per minute of water enter into the shaft, the Contractor shall seal the demonstration hole and further stabilize the ground before repeating the demonstration step.
2. After successful completion of the first demonstration step, the Contractor shall demonstrate the stability of the ground by cutting an approximately 18 inch diameter whole in the shoring wall at the location of previous demonstration hole. If no soil or less than 5 gpm of water enters the shaft, the Contractor may progress to the next demonstration step. If soil or more than 5 gallons per minute of water enters the shaft, the Contractor shall seal the demonstration hole and further stabilize the ground before repeating the demonstration step.
 3. After successful completion of the first two demonstration steps, and if the Contractor believes the portal stabilization work is sufficient, the Contractor may proceed with remainder of the shaft wall penetration procedures.
 4. Successful completion of shaft wall penetrations and related activities necessary to demonstrate such shall be at the Contractor's sole expense.

1.08 QUALITY CONTROL, TESTS, AND INSPECTIONS

- A. Contractor Qualifications and Experience: The Contractor who shall perform the work specified herein shall have successfully completed at least 3 shafts using each of the proposed shaft construction methods of similar size, depth, and complexity, and in similar soil conditions, within the past 6 years. In addition, the superintendent(s) for the construction work shall have demonstrated successful experience with the proposed shaft construction method(s).
- B. The Contractor shall immediately notify the Engineer, in writing, when any problems are encountered with equipment or materials, or if the Contractor believes the conditions encountered are materially and significantly different than those represented within the Contract Documents.
- C. Construction Monitoring: Settlement of adjacent property and/or facilities will not be permitted. Monitor shaft excavations in accordance with Section 02260 - Excavation Support and Protection.
- D. The Contractor shall coordinate with the Engineer regarding additional quality assurance testing to be provided at the Owner's discretion. The Contractor shall permit free access during construction of shoring systems for the Owner's testing staff. The Contractor shall allow access to the Engineer and shall furnish necessary assistance and cooperation to aid the Engineer in observations and data and sample collection.
- E. Quality control, testing, and inspection shall be provided as required by the Contractor's design engineer and in accordance with approved submittals. The Contractor's design engineer shall visit the site to observe the work in progress.
- F. All work shall be performed in the presence of the Construction Manager, unless the Construction Manager has granted prior approval in writing to perform such work in her/his absence.

1.09 SUBMITTALS

- A. Submittals shall be made in accordance with the requirements of these Specifications, and shall provide sufficient detail to allow the Engineer to judge

whether the proposed equipment, materials, and procedures will meet the Contract requirements. All drawings shall be legible with dimensions accurately shown and clearly marked in English. Review and acceptance of the Contractor's Submittals by the Engineer shall not be construed in any way as relieving the Contractor of its responsibilities under this Contract. Submit items B through K of this Section at least 60 days before planned shaft construction.

B. Qualifications:

1. Name and qualifications of person responsible for excavation support system design, and who will sign and seal the shaft design drawings.
2. For each shaft type to be constructed, submit the name of the subcontractor or Contractor that will perform that shaft construction work and written documentation summarizing the qualification of the firm, description of reference projects including owner's name and telephone numbers, details of shaft geometry and construction, and soil and groundwater conditions, as required in Section 1.06 A.

C. Shop drawings - The following information shall be submitted for each shaft:

1. Scaled drawings (plan and section views with dimensions and sizes) showing the proposed shaft elements; adjacent and nearby existing structures and utilities; details of all pipe penetrations; staging areas for all shaft construction operations such as material and equipment storage.
2. Submit a letter signed by authorized representatives of General Contractor, shaft subcontractor, and tunneling subcontractor, stating that the parties have reviewed the jacking and reception shaft designs, and the designs meet performance and safety requirements of the tunneling subcontractor, including provisions for adequate jacking capacity, working space, and safe retrieval of the tunneling equipment.
3. Details for protecting existing utilities and structures.
4. Methods and sequencing of excavation, and installation of staged excavation support.
5. A schedule with major milestones such as driving of sheets for sheetpile shafts, drilling of pilot hole and reaming to full diameter for auger-drilled shafts, pouring of concrete slab, grouting, and dewatering of the shaft interior, etc.
6. Methods and details of containment, hauling, and disposal of the excavated materials, all spoils and other materials used in shaft construction. Submit written documentation signed by the disposal site owner or manager indicating that the site will accept the spoil and that the site is in compliance with all applicable local, State, and Federal regulations. Submit proposed locations of any stockpiled excavation materials.
7. Describe procedures for excavation of the soils from the shaft interior. Describe the procedures for excavation of material below the reach of conventional hydraulic excavators. For shafts that extend below groundwater, describe procedures for groundwater control during excavation (groundwater cutoff, grouting, etc.) or procedures for "in-the-wet" excavation and shaft bottom seals.
8. Describe procedures for dewatering the shaft interior after excavation is complete (for "in-the-wet" construction), and for control of groundwater inflows after excavation has been completed, method of maintaining bottom stability, and protection of subgrade.
9. Procedures for checking and maintaining plumbness of the shaft and ensuring proper elevation has been reached.

10. Concrete mix information and placement procedures for the concrete slab and/or any annular grout.
 11. Methods for backfilling of voids as required to minimize ground movement and protect adjacent property.
 12. Measures to control groundwater inflows, methods of maintaining bottom stability, and protection of subgrade.
- D. Design Assumptions and Calculations: Submit all calculations in a neat and legible format. The calculations shall be performed by or under the direct supervision of a licensed civil or structural engineer, registered in the State of California, who shall seal and sign the calculations that include the following at a minimum:
1. Clearly state design assumptions and basis for making the assumptions.
 2. Design groundwater elevation and basis.
 3. Calculations for the shaft support elements and any bracing, indicating the shaft can withstand all earth and unrelieved groundwater pressures, equipment, applicable traffic, and construction loads and other surcharge loads in accordance with the site conditions, the conditions described in the Geotechnical Report, the conditions anticipated by the Contractor, and any other requirements described in the these Drawings and Specifications.
 4. Calculations for the structural design of the concrete slab, and uplift resistance of the shaft. Confirm that concrete slab weight, structural connection to shoring walls, weight of shoring, and any frictional resistance assumed along sidewalls of the shaft are adequate to resist uplift and that assumptions are reasonable and appropriate. Confirm that a minimum factor of safety of 1.3 against uplift is achieved under the most extreme loading conditions.

~~E. Soldier Pile and Lagging Shafts:~~

- ~~1. Describe the equipment, procedures, and sequence to be used to construct the soldier pile and lagging shafts.~~
- ~~2. Provide details for installing piles, lagging, plates, wales, struts and braces.~~
- ~~3. Describe method of monitoring deviation of shaft supports and proposed corrective measures to be implemented if necessary.~~
- ~~4. Describe method for placing concrete working slab.~~
- ~~5. Describe method for ensuring dry shaft bottom for tunneling operations.~~ ^{AD2}

~~F.E. Steel Sheetpiles:~~

1. Describe equipment and procedures to be used to construct the sheetpile shafts.
2. Describe procedures for pre-drilling operations.
3. Describe procedure for installing and sealing corners.
4. Describe procedure for installing concrete slab to the required thickness and at the correct elevation.

~~G.F. Cutter Soil Mixed Shafts:~~

1. Describe the equipment, procedures, and sequence to be used to construct the shafts using cutter soil mixing.
2. Describe the drilling equipment and procedures and their successful use on other projects with similar soil conditions.
3. Provide details for drilling template for ensuring that panels will have sufficient overlap throughout the panel depth, without gaps.
4. Provide drilling fluid design to maintain borehole stability during drilling.

5. Describe method of monitoring deviation from vertical of panels during excavation, and details of proposed corrective measures to be implemented if necessary.
6. Describe soilcrete design, including assumed soil parameter values, to be used for panels. Include required design soilcrete strengths, and anticipated cure time to achieve design strength.
7. Include methods for sampling soilcrete at depth.
8. Describe methods for installing reinforcing steel or wales, if used.

H.G. Secant Pile Shafts:

1. Description of the equipment, procedures, and sequence to be used to construct the secant pile shafts:
 - a. Describe the drilling equipment and procedures for successful use on other projects with similar soil conditions.
 - b. Details for drilling template and pile layout to ensure that secant piles are drilled contiguously, without gaps.
 - c. Methods for providing continuous support of the bore holes during drilling, including design of the drilling fluid.
 - d. Method of monitoring deviation from vertical of pile holes during excavation, and details of proposed corrective measures to be implemented if necessary.
 - e. Methods for placing tremie concrete and handling displaced drilling fluid, if applicable.
 - f. Methods for installing reinforcing or wales.

I.H. Water Control Plan: Submit methods and equipment proposed to be utilized to prevent excessive water from entering shafts and tunnels, and to remove and dispose of the water that does enter.

1. Submit drawings indicating location and configuration of water control facilities including, but not limited to, water control barriers, monitoring wells, sumps, discharge lines, storage tanks or basins, and discharge points or disposal methods.
2. Submit detailed description of water control schedule, operation, maintenance, and abandonment procedures.
3. Submit drawings and details of treatment facilities to be used in treating water that collects within the shafts.
4. Submit a copy of all applicable permits required for discharge of collected water or documentation of proper offsite disposal plans.

J.I. Portal Stabilization: Provide a description of the methods to be used for each portal stabilization technique proposed. Provide a description of the method for verifying soil stability prior to removing shoring at entry and exit portals. Provide shop drawings showing the details and dimensions of each stabilization system and full narrative describing the procedures.

1. Provide a description of the secondary or remedial methods that will be employed if the initial stabilization efforts fail to achieve the required stabilization.
2. Provide mix designs for any concrete, grout, or soil-cement proposed as a part of the portal stabilization work

K.J. Construction Records: The Contractor shall submit the following to the Engineer at the times indicated:

1. Written daily progress reports shall be submitted during construction. The progress reports shall have field logs recorded at intervals of five feet or less during excavation and shall be submitted to the Engineer within one working day of the shift for which the logs were created. As a minimum, the logs shall include:
 - a. The date, starting time, and finish time.
 - b. Equipment used.
 - c. Actual quantities and descriptions of excavated material.
 - d. Any unusual conditions, breakdowns, and delays, including problems with support.
 - e. Detailed description of the support installed, including sizes, lengths, and spacing.
 - f. Pumping rates from shaft sumps, and inflow conditions.
 - g. Deformation monitoring results, and record of action taken by the Contractor's designer and the Contractor if deflections are excessive.
2. Results of all material and field tests shall be submitted at the end of each shift, and results of lab tests within one week of completing each test.

~~L.K.~~ Post-Construction: Within 15 days of backfill of excavations, the Contractor shall submit a detailed as-built location plan of all remaining buried shoring members including size, location, and cutoff elevation.

PART 2 PRODUCTS

2.01 MATERIALS

- A. All structural steel used for the supporting systems, whether new or used, shall be sound and free from defects which may impair strength.
- B. Structural Steel: ASTM A36.
- C. Steel Sheetpiles: ASTM A328.

2.02 EQUIPMENT

- A. Hydraulic-Press Sheetpile Installation: Steel sheetpiling to be installed and extracted by hydraulic-press methods shall use the following approved equipment, or Engineer approved equal that uses a non-vibratory, non-percussive hydraulic-press method.
 1. Silent Piler - Manufactured/distributed by Giken America Corp.
 2. Still Worker - Manufactured/disturbed by Kowan Company, Ltd.

PART 3 EXECUTION

3.01 GENERAL

- A. Work hours and work days shall comply with all permit restrictions and shall be in accordance with requirements established in the Contract Documents.

- B. Shaft excavations and site development shall commence only after approval of applicable submittals by the Engineer. Install excavation support systems in accordance with approved submittals.
- C. Shaft construction activities shall not begin until the following tasks have been completed:
 - 1. Site safety representative has prepared a code of safe practices and an emergency plan in accordance with OSHA and other applicable requirements. Provide the Engineer with a copy of each prior to starting pipejacking.
 - 2. Hold safety meetings and provide safety instruction for new employees as required by OSHA.
 - 3. Conduct a pre-construction safety conference in accordance with OSHA requirements. Arrange this conference and inform the Engineer of the time and place of the conference at least seven (7) days in advance.
 - 4. Contractor has requested locates from all utility owners, in accordance with State One-call Laws and Common Ground Alliance best practices, and all requested utility locates have been made, or area marked clear.
 - 5. Contractor shall conduct visual site inspection and records search of as-builts to investigate potential unmarked, mismarked, and abandoned utilities.
 - 6. Contractor shall confirm locates of all marked and discovered utilities, using vacuum potholing or other soft dig techniques for all adjacent utilities within the tolerance zone defined by State One-Call Laws.
- D. Before beginning construction, adequately protect existing structures, utilities, trees, and other existing facilities. The repair of or compensation for Contractor-caused damage to existing facilities shall be at no cost to the Owner.
- E. The Contractor shall furnish all necessary equipment, materials, power, water, and utilities for shaft construction, utility protection, utility replacement, and other associated work required for the Contractor's methods of construction.
- F. Excavation shall be performed in sequence with installation of shoring and bracing in a manner that limits settlement of surrounding ground and adjacent vaults, utilities, structures, or roads, and that presents no hazard to traffic.
- G. The Contractor shall conduct all excavation, shoring, temporary facilities, materials storage, and construction traffic within construction easements established for this project. All work shall be in accordance with applicable permits.
- H. All welding shall conform to the applicable provisions of ANSI/AWS D1.1.
- I. The Contractor shall provide temporary safety railing and fencing around all excavations.
- J. The deviation from plumb shall not exceed one (1) foot (12 inches) in 100 feet or 1 percent. Any correction of shaft deviation, and any construction and associated costs resulting from relocation of appurtenances inside the shaft, including pipe connections and the launch and retrieval seals, caused by the shaft's deviation from plumb or other deficiencies in workmanship shall be accomplished at the Contractor's expense and shall not be cause for schedule extension.

- K. All excavated spoils, polymers, or other materials used during shaft construction shall be completely contained when stockpiled on site, and shall be disposed of by Contractor at a licensed landfill site at completion of the shaft construction. Any spills shall be completely contained and cleaned up promptly by the Contractor. Under no circumstances will spoils or polymers be allowed to enter sanitary or storm sewers or any water body.
- L. Pumping from shaft sumps shall not result in boils, softening of the ground, or loss of fines. Sumps, sub-drains, and drain blankets shall be installed as necessary, using suitable filters or screens so that fines are not removed from the formation.

3.02 INTERNAL BRACING SUPPORT SYSTEM

- A. Internal supports, including wales, struts, and corner braces, if needed, shall be installed sequentially as the shaft is excavated. At no time shall the unsupported excavation depth exceed the design spacing plus 2 feet of horizontal support members as shown on approved submittals. All internal supports shall be installed within ± 3 inches of design locations shown on approved submittals.
- B. The internal bracing support system shall include wales, struts, corner braces, and/or plate stiffeners, as appropriate to safely support the design loads and consistent with means and methods of Contractor:
 - 1. Struts with intermediate bracing shall be provided as needed to enable shafts to carry maximum design load without distortion or buckling.
 - 2. Web stiffeners, plates, or angles shall be included as needed to prevent rotation, crippling, or buckling of connections and points of bearing between structural steel members. Allow for eccentricities caused by field fabrication and assembly.
 - 3. All bracing support members shall be installed and maintained in tight contact with each other and with the surface being supported.
 - 4. Bracing members shall be preloaded by jacking struts to control shoring movement. Bracing members shall be preloaded in accordance with methods, procedures, and sequences as described in the submittals. Excavation work shall be coordinated with installation of bracing and preloading. Steel shims and steel wedges shall be welded or bolted in place to maintain the preloading force in the bracing after release of the jacking equipment pressure. Support and preload shall be installed immediately after installation and prior to continuing excavation.
 - 5. Procedures that produce uniform loading of bracing member shall be used without eccentricities or overstressing and distortion of members of system.

~~3.03 SOLDIER PILE AND LAGGING SHAFTS~~

- ~~A. Install piles to the tip elevations shown in reviewed and accepted submittals. If predrilling is necessary, provide casing or drilling mud, as necessary, to prevent caving of holes and loss of ground.~~
- ~~B. For predrilled piles:
 - 1. After each soldier pile has been seated plumb in the drill hole, encase it with concrete or crushed rock from the tip to the bottom level of the final excavation.
 - 2. Apply vibration through the pile.~~

~~3. Concrete strength shall be in accordance with submittals, and concrete shall be placed by means of a tremie system.~~

~~C. Provide timber, steel, or precast concrete lagging or sheets of sufficient thickness to withstand lateral earth pressures.~~

~~D. Install lagging with no gap between adjacent boards. As installation progresses, backfill the voids between the excavation face and the lagging with sand, pea gravel, or lean grout packed into place. Pack with materials such as hay, burlap, or geotextile fabric where necessary to allow drainage of groundwater without loss of ground due to piping.~~ ^{AD2}

3.043.03 STEEL SHEETPIILING INSTALLATION

- A. Steel sheetpiling shall be used only where the existing subsurface conditions are suitable for the installation of sheetpiling, including the use of pre-drilling to loosen the soils, to the full depth of penetration required, and to proper alignment and plumbness, without damage to the sheetpiling or rupture of its interlocks.
- B. Sheetpiles shall be driven in plumb position with each sheetpile interlocked with adjoining piles for its entire length so as to form a continuous diaphragm throughout the length of each run of wall, bearing tightly against original ground. Sheetpiles shall be driven to the depth indicated on the shop drawings. Care shall be exercised in driving so that interlocking members can be extracted without damaging adjacent structures or utilities. The methods of driving, cutting, and splicing shall conform to the Shop Drawings.
- C. Sheetpile corners shall be installed with interlocks and bulbs properly engaged for full depth of sheetpiles. If interlocks and bulbs cannot be properly engaged for full depth, connections shall be welded continuously to seal all cracks and avoid inflows of groundwater and soils.

3.053.04 CUTTER SOIL MIXED SHAFTS

- A. The Contractor shall excavate a guide trench to help achieve the necessary position and vertical alignment of the soilcrete panels and to help contain drilling fluid.
- B. Excavate panels in such a manner that the soil outside the panel is not adversely affected. Use excavation methods that will minimize over-excavation, loosening, and caving of material outside the panel.
- C. Panels shall be completed continuously from the ground surface to the required depth and mixed with cement to form soilcrete.
- D. During cutting and mixing of panels, Contractor shall fully contain all soil, drilling fluids, cement slurry, and wet soilcrete, and prevent all such materials from leaving the allowable work area, or entering any sanitary sewer, storm drain, or surface drainage ditch.
- E. Contractor shall take concrete samples from soilcrete panels and test for compressive strength at 24-hours and 7-days. Test results must be submitted to the Construction Manager prior to excavation of the interior of the shaft.

- F. Do not advance secondary panels until concrete in adjacent primary panels has been in place a minimum of 24 hours. Do not advance secondary panels if adjacent primary panels contain unset concrete.
- G. Addition of cement to form soilcrete shall continue in one operation from the bottom to the top of the panel.
- H. For panels determined to be defective, the Contractor shall submit a remedial action plan to the Construction Manager for review. Only proven methods and materials will be allowed for repair.

3.063.05 SECANT PILE SHAFTS

- A. The Contractor shall construct proper guides to help achieve the necessary position and vertical alignment of the secant piles. Guides shall be fully constructed prior to construction of secant piles.
- B. Secant pile bore holes shall be completely supported by properly designed drilling fluid or continuous temporary casing at all times during drilling.
- C. If used, casings shall be equipped with cutting teeth to provide positive cut into the previously installed adjacent piles and installed by either rotating or oscillating the casing. Installing the casing by vibratory or percussive means will not be allowed. Remove temporary casing while the concrete remains workable. Sufficient quantity of temporary casing shall be onsite at all times.
- D. Excavate bore holes in such a manner that the soil outside the pile diameter is not adversely affected. Use pile boring methods that will minimize over-excavation, loosening, and caving of material outside the pile diameter.
- E. Pile borings shall be completed continuously from the ground surface to the required depth and backfilled with concrete. If the pile excavation and backfilling cannot be completed in a continuous operation, the excavation shall be backfilled to a minimum depth of 5 feet above the bottom of the excavation.
- F. Do not advance secondary piles until concrete in adjacent primary piles has been in place a minimum of 24 hours. Do not advance secondary piles if adjacent primary piles contain unset concrete.
- G. Place concrete by the tremie method, in such a manner that the concrete displaces the drilling fluid or groundwater progressing from the bottom and rising uniformly to the ground surface. Concrete placement shall continue in one operation to the top of the pile hole. Throughout the underwater concrete placement operation, the discharge end of the tube shall remain submerged in the concrete at least 5 feet.
- H. Casing shall be extracted while the concrete within remains sufficiently workable to ensure that the concrete is not lifted. When the casing is withdrawn as concreting proceeds, a sufficient head of concrete shall be maintained to prevent the entry of groundwater or soil that may cause contamination of concrete or reduction of cross section of the pile.
- I. During drilling and concrete placement of piles, Contractor shall fully contain all soil, drilling fluids, and concrete, and prevent all such materials from leaving the

allowable work area, or entering any sanitary sewer, storm drain, or surface drainage ditch

- J. For those piles determined to be defective, the Contractor shall submit a remedial action plan to the Construction Manager for review. Only proven methods and materials will be allowed for repair.

3.073.06 GROUNDWATER CONTROL

- A. Conduct any dewatering operations and all water control operations in accordance with Section 02240 - Dewatering and the Water Control for Shafts and Tunnels part of this Section.
- B. Provide the necessary groundwater control measures at the site to perform the Work, to provide safe working conditions, and to prevent excessive inflow of water into the shaft during and following construction operations.
- C. The Contractor's groundwater control method shall provide means to prevent inflow of fines and other adverse effects due to groundwater. In the event any damage does occur, the Contractor shall be fully responsible for correction of damage.
- D. Provide sufficient backup pumping equipment at the site to assure that the operation of the groundwater control system can be maintained without interruption.

3.083.07 SHAFT WALL PENETRATION

- A. Shaft wall penetrations for tunneling exit through the jacking shaft and entry into the reception shaft shall be in accordance with Part 1.07 of this Section.

3.093.08 INSTRUMENTATION AND SETTLEMENT MONITORING

- A. Performance of excavation support system shall be monitored for both horizontal and vertical deflections, as specified in Section 02260 - Excavation Support and Protection.
- B. If excessive settlement or deflection of supports or surface features occur that exceed those values predicted by the Contractor's shoring designer, modifications to the excavation and shoring approach will be required. Revised shop drawings and calculations shall be submitted by the Contractor to the Engineer. Changes to excavation sequence and shoring shall be implemented as may be necessary at no additional cost.

3.103.09 REMOVAL OF SUPPORT SYSTEM AND BACKFILL ^{AD2}

- A. Contractor shall backfill shaft excavations with aggregate base course in accordance with Section 02300 or controlled low strength material in accordance with Section 02312. ^{AD2}

A.B. Excavation support shall not be removed until support can be removed without damage to existing facilities, completed work, or adjacent property.

B.C. All excavation support shall be removed at the completion of the trenchless construction and tie-in work.

~~G.D.~~ Excavation support shall be removed in a manner that will maintain support as excavation is backfilled and will not leave voids in backfill. Removal of the support system shall be performed in a manner that will not disturb the pipeline, the compacted backfill, or adjacent construction or facilities.

~~D.E.~~ Any void left by shoring system or voids created by the removal of the shoring system shall be filled with controlled density fill, lean concrete, or cement grout, as approved by the Engineer to provide soil support between backfill zone and the native soil.

~~E.F.~~ Sheetpile ~~and soldier pile or beam~~^{AD2} removal shall be performed in a manner that will avoid "vibro-consolidation" of sandy or granular material below the excavation that could lead to settlement of the pipeline or other works of construction.

~~F.G.~~ Where possible, the shaft shall be entirely removed. Where a shaft cannot be entirely removed, not less than the top 10 feet of the shaft shall be cut from the rest of the shaft and removed.

~~G.H.~~ The support system removed from the excavation shall remain the property of the Contractor and shall be removed from the site.

3.113.10 SAFETY

- A. All materials and methods of construction shall meet the applicable requirements of the Contract Documents.
- B. The Contractor shall be solely responsible for, and bear the sole burden of cost for any and all damages resulting from improper shoring or failure to shore.
- C. The safety of workers, the protection of adjacent structures, property, and utilities, and the installation of adequate supports for all excavations shall be the sole responsibility of the Contractor.
- D. The design, planning, installation and removal of all shoring shall be accomplished in such a manner as to maintain stability of the required excavation and prevent movement of soil that may cause damage to adjacent shoring systems, structures and utilities, damage or delay the Work, or endanger life and health.
- E. Shafts in active use shall be surrounded by a security fence, consisting of six-foot high chain link fence, installed completely around the shaft perimeter and shall have a lockable entry gate to prevent unauthorized access. Shafts not in use for more than 72 consecutive hours, shall be covered with traffic plates or surrounded with a six-foot high chain link fence and safety cage or netting to discourage unauthorized entry or access.
- F. Where shafts are located adjacent to roadways, the Contractor shall install temporary type K rail between the shaft and roadway to prevent the possibility of motorists from accidentally driving into the work area or shaft.

3.123.11 CLEANUP

- A. The Contractor shall remove all construction debris, spoil, polymer, slurry, oil, grease, and other materials from the shaft, pipeline, and all surface work areas

upon completion of construction of the pipeline. Cleanup will be incidental to the construction. No separate payment shall be made for the cleanup.

END OF SECTION

AD2 Addendum No. 2.