COUNTY OF YOLO

DEPARTMENT OF COMMUNITY SERVICES, PUBLIC WORKS DIVISION

NORTH DAVIS MEADOWS
WATER SYSTEM CONSOLIDATION PROJECT

COUNTY WORK ORDER No. XXXX

BID DOCUMENTS

December 2018

WEST YOST ASSOCIATES

COUNTY OF YOLO

DEPARTMENT OF COMMUNITY SERVICES, PUBLIC WORKS DIVISION

NORTH DAVIS MEADOWS
WATER SYSTEM CONSOLIDATION PROJECT

BID DOCUMENTS

December 2018

DESIGN CERTIFICATION

The Plans and Technical Specifications Volume 6 contained herein have been prepared by, or under the responsible charge of, the following registered person(s):

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12/6/2018

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Exp. Date: 12/31/19

COUNTY OF YOLO

NORTH DAVIS MEADOWS WATER IMPROVEMENTS

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DIVISION II GENERAL CONSTRUCTION

10 GENERAL

10-1 GENERAL

10-1.01 SUMMARY OF WORK

10-1.01A GENERAL

10-1.01A(1) Section Includes

A. General description of the Project and the Work to be performed by the Contractor.

10-1.01A(2) Work Covered by Contract

A. The Work covered under this Contract will be performed along public right of ways and within easements on private property located within the County of Yolo, and through the Davis Golf Course under agreement with the City of Davis. The project location is indicated on the Drawings.

B. The Work to be performed by the Contractor generally includes:

1. Furnishing all labor, superintendence, materials, power, water, tools, equipment and services required by the Contract Documents or required to complete the Work.
2. Coordinate work of all trades.
3. Furnishing and installing miscellaneous items incidental to or necessary for completion of the Work, whether these items are specifically indicated in the Contract Documents or not.

C. The Work consists of construction of the following items:

1. Installing approximately 10,563 linear feet of new potable water main piping with gate valves, air valves, blow-offs, and water system appurtenances in existing road right-of-way and across public lands, including a public golf course;
2. bored and jacked installation of 62 linear feet of 27” steel casing for 14” water pipe;
3. connecting new City water pipe mains to an existing County-owned water system;
4. installing water meters on approximately 102 existing services to 94 existing homes and 8 existing public irrigation systems along with new service piping to 13 of those services and replacement of a backflow preventer;
5. locating and exposing existing water service boxes that are buried under private landscaping;
6. cap or plug and abandon in place various portions of existing 6-inch water mains that are being replaced with 8-inch mains or otherwise removed from service;
7. staging of multiple tie-ins to existing system to keep existing system in service, and then flushing the combined new system to eliminate existing, non-potable well water from the system;
8. performing incidental replacement of plain and decorative concrete driveways, walkways and golf cart paths, unit pavers and hot mix asphalt paved roadway;
9. preserving and protecting or replacing in-kind existing golf course features, including a park bench;
10. preserving and protecting existing golf course irrigation systems;
11. preserving and restoring various landscape planting and irrigation features; and
12. establishing any restored or replaced lawns and other landscape plantings.

10-1.01A(3) Regulatory Requirements

A. Comply with all Federal, State, and local laws, regulations, codes, and ordinance applicable to the work.

B. References in the Contract Documents to ”County” shall mean County of Yolo, and “City” shall mean City of Davis.

C. Other standards and codes that apply to the work are designated in the Specifications.

10-1.01A(4) Protection of Public and Private Property

A. Pipeline construction will encounter numerous existing features of various types, such as fences, drain culverts, irrigation facilities, roadside drainage facilities, park benches, mailboxes, signs, plain and decorative concrete surfacing, such as driveways, walkways and golf cart paths, asphalt pavement, buildings, utility poles, guy wires and other surface structures. Contractor shall protect existing features of this nature and all features affected by construction operations shall be restored to their original condition.

B. To the greatest extent possible, remove existing features without damaging the materials and re-use the material to place back in the original condition. When existing features are damaged during removal, install new materials of similar type, appearance and function, at no additional cost to the Owner.

C. Contractor shall be responsible for all damage to streets, roads, driveways, pathways, highways, shoulders, ditches, embankments, culverts, bridges, and other public or private property, regardless of location or character, that may be caused by transporting equipment, materials, or workers to or from the work or any part or site thereof, whether by Contractor or Contractor’s subcontractors or suppliers.

D. Make satisfactory and acceptable arrangements with the Owner of, or the agency or authority having jurisdiction over, any damaged property concerning its repair, replacement, or payment of costs incurred in connection with the damage.

E. Keep fire hydrants and water control valves free from obstruction and available for use at all times.

10-1.02 SITE CONDITIONS

10-1.02A GENERAL

10-1.02A(1) Relationship with Existing Facilities

A. The existing well water system is owned by the County of Yolo and operated by the City of Davis, and the City of Davis owns and operates wastewater facilities located on the project site. The Work under this project will interface with these existing facilities.

B. City of Davis personnel will be responsible for operating and maintaining the existing facilities throughout the execution of this Contract.

C. Take particular care to avoid clutter and debris at the site of the work. This includes all work areas and staging areas

D. Except for allowable out-of-service periods as specified, the Contractor shall be responsible for maintaining in operation during construction all water, wastewater, and storm water facilities.

10-1.02A(2) Contractor’s Responsibility for Utility Properties and Service

A. Notify owners of existing utilities prior to the performance of work in the vicinity of their facilities. Provide notification at least two business days in advance of excavation, the date and location of the excavation to be undertaken.

B. Do not begin excavation until receiving a written notification from operators of underground facilities and utility operators that they have:

1. Marked the locatable underground utilities; or
2. Provided a description of underground utilities in the area of the proposed excavation that cannot be located; or
3. Provided notification that no utilities exist within the area of the proposed excavation.

C. Once underground utilities have been marked, maintain marks during the course of the work.

D. Where the Contractor's operations could cause damage or inconvenience to existing telephone, power, oil, gas, water, sewer, or irrigation systems, make arrangements necessary for the protection and sustained operation of these utilities and services. If temporary disruption is necessary to complete the work, make arrangements with the owner of the utility prior to service cutoff and also notify the Engineer.

E. The Contractor is solely and directly responsible to the Owners of utilities, property, fences, and other existing appurtenances for any damage, injury, expense, loss, inconvenience, delay, suits, actions, or claims of any character brought because of any injuries or damage that may result from the construction operations under this Contract.

F. Neither the Owner nor its officers or agents shall be responsible to the Contractor or the Contractor's subcontractors for damages as a result of the Contractor's failure to protect utilities encountered in the work.

G. Replace, at Contractors expense, any and all existing utilities or structures damaged during construction, unless otherwise provided for in these Contract Documents.

10-1.02A(3) Existing Facilities

A. Existing utilities are shown on the drawings. The type, location, size and depth of existing underground utilities shown on the Drawings were obtained from sources of varying reliability. Efforts have been made to locate and delineate all known underground facilities; however, the Engineer cannot assume responsibility for the completeness and/or accuracy of the delineation of underground facilities whether shown on the Drawings or not, nor for the existence of other buried objects and/or facilities which may be encountered but are not shown on the Drawings.

B. Connecting to Existing Facilities: Expose all underground facilities that are to be connected to or that might be affected by the construction of the proposed improvements for verification of location and elevation prior to ordering pipe.

10-1.02A(4) Field Relocation

A. During the progress of construction, minor relocations of the work may be necessary. If field conditions are encountered that will prevent construction as shown, notify the Engineer before continuing with the work. The Engineer may make minor field revisions as necessary to resolve the field condition without change in the Contract Price. If the Contractor fails to notify the Engineer when such field conditions are encountered, and proceeds with the work despite the interference, it shall be at the Contractor's own risk.

10-1.03 WORK SEQUENCE AND CONSTRAINTS

10-1.03A GENERAL

10-1.03A(1) Section Includes

A. Schedule requirements, construction constraints, and a suggested Work sequence for specific elements of the Project.

10-1.03A(2) General Sequencing Requirements

A. The sequencing requirements and construction constraints described are critical elements of the Work and are presented to underscore the importance of proper management, planning, scheduling, coordination, and execution of the Work.

B. Sequencing requirements and construction constraints have been defined in this Section for only certain structures, facilities, and elements of the Work. All work, whether or not addressed in this Section, shall be governed by applicable specified requirements. If additional shutdown constraints are necessary to allow implementation of Contractor's construction procedures and schedule, the Engineer will establish such constraints.

C. Contractor's Construction Schedule:

1. Clearly illustrate the proposed sequence of construction.
2. Conform to the sequencing requirements and limitations specified in this Section where specified.
3. Modify or adapt the suggested sequencing as necessary to complete the project provided all environmental and service continuity requirements are met.

10-1.03A(3) Photographs and Video

A. Prior to disturbing any area of the project site, the Contractor shall take sufficient photographs and/or video of each area that will be disturbed during construction, documenting preconstruction conditions. Contractor shall provide a minimum of one photograph every 100 feet along project alignment and multiple photos of any staging, insertion, excavation or reconstruction areas. The same views shall be photographed upon completion of construction activities on any section of the project, and submitted with Contractor's application for payment for work on the section. Pre-construction photography shall document the pre-construction condition of existing landscaped areas, trees and plants, fences, streets, sidewalks, drives, and in general, any area that will be disturbed on private properties before commencing work. Photographs shall be prepared and submitted in accordance with Section 10-1.07

B. Contractor shall provide a video recording of each road within the project area before and after all project work is performed for verification of damage caused by Contractor's project work. Video recordings shall be taken at a speed and image resolution capable of capturing and displaying the levels of cracking and breakage in the roadway pavement.

10-1.03A(4) Work Affecting Private Property

A. It is essential that the Contractor carefully coordinate the work with private landowners who will be affected by the construction.

B. Prior to beginning work within easements on private land, Contractor shall meet with the private landowner to discuss the work that will be undertaken on the private land. Contractor shall be prepared to discuss the following topics:

1. Sequence and schedule of the work.
2. Areas which will be affected by the work.
3. Points of access onto the property.
4. Vehicle travel routes.
5. Storage of materials.
6. Other construction related issues that affect the private landowner.

C. Contractor shall coordinate the meeting date, time and place with the Engineer and the private landowner.

D. Prior to beginning work that is within public right-of-way, but which will temporarily affect owners of private driveways, mailboxes, and other items of private ownership, notify the property owner of the impending construction and provide a written description of the extent of the work that will affect that property owner, the projected impacts and the schedule for completing the work and removing the temporary impact.

1. Notification may consist of fliers that are hung from door handles and shall identify the Contractor's contact person and phone number.

10-1.03B PRODUCTS (NOT USED)

10-1.03C EXECUTION

10-1.03C(1) Work Coordination

A. Schedule and coordinate the overall Work and construction operations, including the work of subcontractors and the timely provision of products and supplies.

B. Perform Work in an orderly and logical sequence. Individual specification Sections may identify specific requirements that are related to Work sequence. These types of constraints are not repeated in this Section but shall be followed by the Contractor.

10-1.03C(2) Work Constraints

A. Work Hours

1. Except as otherwise required for the safety or protection of persons and except as otherwise stated in the Contract Documents, Work may only be performed Monday through Friday during the hours of 8:00 am and 5:00 pm. Contractor will not perform of Work on a Saturday, Sunday or any legal holiday defined by the City of the County without written consent from the Owner.
2. Legal holidays are defined as:
    a. New Year's Day on January 1.
    b. Martin Luther King's Day, third Monday in January
    c. President's Day, third Monday in February
    d. Memorial Day on the last Monday in May.
    e. Independence Day on July 4.
    f. Labor Day on the first Monday in September.
    g. Veteran's Day, November 11
    h. Thanksgiving Day on the fourth Thursday in November.
    i. Christmas Eve, December 24
    j. Christmas Day on December 25
    k. New Year's Eve on December 31.
    l. Both the City and County are subject to closure for the week between Christmas and New Year's Day.
    m. When a holiday falls on Sunday, the following Monday is recognized as the legal holiday. When a holiday falls on a Saturday, the preceding Friday is recognized as the legal holiday.

10-1.04 MEASUREMENT AND PAYMENT

10-1.04A GENERAL

10-1.04A(1) Section Includes

A. Methods of measurement and payment for specific items of Work under this Contract. Refer also to General Conditions for administrative aspects of payments by the Owner to the Contractor.

10-1.04A(2) Bid Components and Payment

A. The Bid Form is comprised of the following components:
   1. Lump Sum Work
   2. Allowances
   3. Unit Price Work

B. Contractor's cost for "Lump Sum Work" shall cover all Work indicated by the Contract Documents with the exception of cash allowances and specific items of work that are to be paid on a Unit Price basis as indicated on the Bid Form. Lump Sum Work will be paid for on a progress payment basis in accordance with the provisions of the General Conditions.

C. "Allowances" are budgets that have been established to reimburse Contractor for costs associated with Work that is undefined at the time of Bid. Allowances are not a ceiling and are used only to provide a figure in the Contract price. Allowances do not limit payment to the Contractor to the stated maximum amount, nor does the allowance entitle the Contractor to the stated amount in the event the allowance is used. Allowances will be administered as part of the partial payment process. Contractor shall show allowances as separate line items on the Schedule of Values and payments will be made on these items only for work undertaken. If the maximum allowance is reached, further work may be authorized and administered as a change order in accordance with the General Conditions. Specific Allowances are described below.

D. "Unit Price Work" is Work indicated on the Drawings or specified. The price of each unit of Work is to be defined by the Bidder in the Unit Price Bid Schedule in the Bid Form and shall include all materials, labor, equipment, and incidentals required to complete each Work Item. When actual Work differs from the basis of the Work Item, costs shall be adjusted on a pro-rata basis or other method suited for the particular condition. Work Items established for this Work have been identified on the Bid Form and are described below.

10-1.04B BID ITEM DESCRIPTIONS

10-1.04B(1) Bid Item 1: Mobilization and Demobilization

A. Bid Item 1 includes payment for all work, equipment, and materials, not included in other bid items, necessary to complete project.

B. No measurement will be made. Payment will be "Lump Sum" and shall be full compensation for, but not limited to, the following:
   1. Obtaining all bonds and required insurance;
   2. Obtaining required permits, licenses, agreements and certifications;
   3. Applying for, obtaining, and complying with encroachment permit from Yolo County;
   4. Applying for, obtaining, and complying with required permits from City of Davis not covered by other pay items;
   5. Obtaining temporary power, telephone, sanitary facilities, and water supply;
   6. Conforming with general environmental control requirements;
   7. Moving onto the site of all equipment, materials and staff including set up of Contractor's staging area/yard(s);
   8. Furnishing and erecting all needed construction facilities, fencing, project signage, project security;
   9. Demobilization, site cleaning and maintenance;
   10. Obtaining, organizing and submitting pre-construction and post-construction photographic and video records, and;

11. All work as required for the proper performance and completion of the project, including progress schedules and reports, contract meetings, and record drawings.

C. Bid Item 1 shall not exceed 5 percent of the total bid price.

10-1.04B(2) Bid Item 2: Sheeting, Shoring, and Bracing

A. Bid Item 2 includes payment to cover sheeting, shoring, and bracing design, for the installation and/or removal of water main, valves and other appurtenances.

B. Includes all work, equipment, and materials necessary to provide sheeting shoring, and bracing using speed shores (trench jacks), speed shores in combination with plywood or steel plates, and trench boxes for shaft and open trench construction in conformance with Federal and California safety codes.

C. No measurement will be made. Payment shall be "Lump Sum" and shall be full compensation for, but not limited to, the following:

1. All submittals.
2. Design, installation and removal of sheeting, shoring, and bracing speed shores, plywood, steel plates, and trench boxes.
3. Abandonment of sheeting and shoring where required.
4. Other excavation supports in place necessary to complete all work under the Contract in conformance with Federal and California Safety and Health Standards, Sections 6700-6708 of the Labor Code and these Specifications.

10-1.04B(3) Bid Item 3: Traffic Control

A. Bid Item 3 includes payment for all work, equipment, and materials necessary to develop plans for and provide traffic control for completion of the entire project.

B. No measurement will be made. Payment shall be "Lump Sum" and shall be full compensation for, but not limited to, the following:

1. All submittals.
2. Furnishing detailed, engineered traffic control plans for approval by the City of Davis and Yolo County as required.
3. Barricades, flaggers as necessary, lighted arrow boards, portable and changeable message boards, signs and detours.
4. Lighting, pedestrian and traffic ramps.
5. Temporary striping, k-rails, and pavement markers.
6. Traffic plates as necessary.
7. All incidentals necessary for worker, pedestrian, bicycle, and vehicle traffic protection.

10-1.04B(4) Bid Item 4: Storm Water Pollution Prevention

A. Bid Item 4 includes payment for all work, equipment, and materials necessary to prepare and implement a plan for control of storm water for the duration of the project.

B. No measurement will be made. Payment shall be "Lump Sum" and shall be full compensation for, but not limited to, the following:

1. All submittals.
2. Preparing and submitting a storm water pollution prevention plan (SWPPP).
3. Providing QSD and QSP to update and oversee preparation and implementation of SWPPP.
4. Providing all information necessary for NOI, NOT, and Annual Report.
5. Preparing and submitting all necessary updates and reports.

6. Performing testing as required.
7. Maintaining records.
8. Submitting all documents and reports in electronic format suitable for uploading.
9. Designing, installing, maintaining, moving, and removing BMPs.
10. All incidentals necessary for compliance with the General Order.

10-1.04B(5) Bid Item 5: Construction Surveying and Staking

A. Bid Item 5 includes all payment for work, equipment, and materials necessary to lay out components of the Work at the proper alignment, elevation, grades, dimensions, and distances indicated on the Drawings.

B. No measurement will be made. Payment shall be "Lump Sum" and shall be full compensation for, but not limited to, the following:

1. All submittals.
2. Furnishing stakes, equipment, tools, materials, and all labor as required for work.

10-1.04B(6) Bid Item 6: Landscape and Site Restoration

A. Bid Item 6 includes payment for all work, equipment, and materials necessary to restore all areas impacted by installation and modification of water mains, services, meters, hydrants, backflow preventers, and appurtenances to preconstruction condition.

B. No measurement will be made. Payment shall be "Lump Sum" and shall be full compensation for, but not limited to, the following:

1. All submittals.
2. Protection and restoration of all surface improvements including concrete walkways, driveways, golf cart paths, medians, curbs, gutters, cross gutters, hot mix asphalt paving, pavement markers, markings and striping, lawns, shrubs, trees, landscape surfacing and groundcover, irrigation systems, decomposed granite and aggregate pathways, decorative stones, cobble drainage ways, utility boxes and lids, survey monuments, and other surface features disturbed by the work on the public system.
3. Establishment and maintenance of replaced and replanted lawns, plants, shrubs and trees for a forty-five (45) day establishment period.

10-1.04B(7) Bid Item 7: Obtain City of Davis Encroachment Permits for Each Metered Connection

A. Bid Item 7 includes payment for all work, equipment, and materials necessary to obtain encroachment permit for each new metered connection.

B. Payment shall be per "Each" encroachment permit acquired and shall be full compensation for, but not limited to, the following:

1. Preparing, submitting, and paying for permits required by the City of Davis to perform work.
2. Meeting permit requirements, scheduling and accommodating City inspections and obtaining approval by City Inspector.

10-1.04B(8) Bid Items 8 through 13: 8-, 12-, or 14--inch Diameter Water Main in CR 99D R/W, Residential Road/Path, Golf Course, or County Property

A. Bid Items 8 through 13 include payment for all work, equipment, and materials necessary to construct new water main with polyvinyl chloride pipe, or ductile iron pipe where required, complete in place.

B. Measurement for payment shall be per horizontal "Linear Foot" of water main to be constructed. Payment shall be full compensation for, but not limited to, the following:

1. All submittals.

2. Coordination and protection of existing utilities including potholing.
3. Sawcutting, removal and legal disposal of concrete or asphalt concrete pavement including pavement containing reinforcing fabric.
4. Removal and stockpiling of top soil.
5. Excavation, spoil handling and legal disposal.
6. Dewatering within excavation using sumps, sump pumps, trash pumps, discharge piping, desilting and discharge using best management practices.
7. Furnishing and installing polyvinyl chloride pipe, or ductile iron pipe where required, of stated diameter and footage, fittings, joint restraint, thrust blocks and anchors, and appurtenances.
8. Furnishing and installing tracer/locating wire and warning tape.
9. Furnishing and installing brass cap and flexible post-type utility location markers for pipe
10. All system disinfection, hydrostatic and disinfection testing and flushing of pipelines, including systematic flushing of non-potable water from existing pipe system.
11. Furnishing and installing backfill for all excavations, furnishing and installing temporary and permanent hot mix asphalt or concrete paving.
12. Daily cleanup, dust control, record drawings and all incidentals required by these Specifications and Drawings.

10-1.04B(9) Bid Item 14: 14-inch Diameter Restrained Joint DIP Water Main in 27-inch Bore-and-Jack Casing in County Road 99D ('CR99D' 301+53 to 302+15)

A. Bid Item 14 includes payment for all work, equipment, and materials necessary to bore-and-jack new ductile iron pipe water main complete in place.

B. No measurement will be made. Payment shall be "Lump Sum" and shall be full compensation for, but not limited to, the following:

1. All submittals.
2. Surveying.
3. Conforming with all codes laws, and permit requirements related to this work.
4. Locating/potholing, protecting, bypassing, and/or replacing existing utilities.
5. Sawcutting, removal and legal disposal of concrete or asphalt concrete pavement including pavement containing reinforcing fabric.
6. Legal disposal of debris.
7. Formwork and concrete.
8. Bottom slab, if needed, or work area installation, and preparation of the work area.
9. Installation of safety and monitoring equipment.
10. Cleaning, lighting, ventilation, temporary fencing, power, dust control, and noise and vibration control and monitoring.
11. Grouting and stabilizing, launching and receiving portals.
12. Dewatering within excavation using sumps, sump pumps, trash pumps, discharge piping, desilting and discharge using best management practices.
13. Design of casing pipe.
14. Settlement monitoring.
15. Spoils handling and proper disposal.
16. Furnishing and installing the permanent casing pipe, casing spacers, restrained joint ductile iron pipe, and restrained fittings.

17. Grouting to fill voids around installed casing.
18. Furnishing and installing sand in annular space.
19. Furnishing and installing casing end seals.
20. Furnishing, placing and compacting backfill.
21. Surface restoration of all public and private improvements including repair or replacing curb and gutter, concrete paving, temporary and permanent paving, and pavement markers and striping.
22. Daily cleanup, dust control, record drawings and all incidentals required by these Specifications and Drawings.

10-1.04B(10) Bid Item 15: 6-inch Diameter Bypass Pipe Installation with One (1) 6-inch Gate Valve complete with tees, taps, and fittings

A. Bid Item 15 includes payment for all work, equipment, and materials necessary to construct a bypass assembly complete in place.

B. Payment shall be per "Each" and shall be full compensation for, but not limited to, the following:

1. All submittals
2. Coordination and protection of existing utilities including potholing.
3. Sawcutting, removal and legal disposal of concrete or asphalt concrete pavement including pavement containing reinforcing fabric.
4. Excavation, spoil handling and legal disposal.
5. Dewatering within excavation using sumps, sump pumps, trash pumps, discharge piping, desilting and discharge using best management practices.
6. Furnishing and installing main line tees, main line hot tap, gate valves, valve boxes, pipe, fittings, and appurtenances.
7. Furnishing and installing backfill, and aggregate base for pavement subgrade, temporary and permanent paving.
8. Daily cleanup, dust control, record drawings and all incidentals required by these Specifications and Drawings.

10-1.04B(11) Bid Item 16: Fire Hydrant Assembly (not including gate valve) and lateral with hot tap connection

A. Bid Item 16 includes payment for all work, equipment, and materials necessary to construct a fire hydrant assembly complete in place.

B. Payment shall be per "Each" and shall be full compensation for, but not limited to, the following:

1. All submittals
2. Coordination and protection of existing utilities including potholing.
3. Sawcutting, removal and legal disposal of concrete or asphalt concrete pavement including pavement containing reinforcing fabric.
4. Excavation, spoil handling and legal disposal.
5. Dewatering within excavation using sumps, sump pumps, trash pumps, discharge piping, desilting and discharge using best management practices.
6. Furnishing and installing main line hot tap, fittings, thrust blocks and anchors, pipe lateral (regardless of length), bury, and hydrant.
7. Furnishing and installing backfill, and aggregate base for pavement subgrade, temporary and permanent paving.

8. Painting (yellow) the above ground portion of the hydrant and installing the Blue Reflective Pavement Marker in the street.
9. Daily cleanup, dust control, record drawings and all incidentals required by these Specifications and Drawings.
10. Salvage of removed fire hydrants.

10-1.04B(12) Bid Item 17: Remove Existing Fire Hydrant Assembly and Cap Lateral

A. Bid Item 17 includes payment for all work, equipment, and materials necessary to remove a fire hydrant assembly and cap the existing lateral.

B. Payment shall be per "Each" and shall be full compensation for, but not limited to, the following:
   1. All submittals
   2. Coordination and protection of existing utilities including potholing.
   3. Sawcutting, removal and legal disposal of concrete or asphalt concrete pavement including pavement containing reinforcing fabric.
   4. Excavation, spoil handling and legal disposal.
   5. Dewatering within excavation using sumps, sump pumps, trash pumps, discharge piping, desilting and discharge using best management practices.
   6. Removal and salvage of existing fire hydrant and hydrant bury.
   7. Removal, handling, transport, and disposal of existing pipe.
   8. Furnishing and installing water-tight cap or plug and appurtenances on hydrant lateral and abandon in place.
   9. Furnishing and installing backfill, and aggregate base for pavement subgrade, temporary and permanent paving.
   10. Daily cleanup, dust control, record drawings and all incidentals required by these Specifications and Drawings.

10-1.04B(13) Bid Items 18: 14-inch Butterfly Valve and Box

A. Bid Item 18 includes payment for all work, equipment, and materials necessary to install isolation butterfly valves as shown on the Drawings complete in place.

B. Payment shall be “Each” and shall be full compensation for, but not limited to, the following:
   1. All submittals
   2. Coordination and protection of existing utilities including potholing.
   3. Sawcutting, removal and legal disposal of concrete or asphalt concrete pavement including pavement containing reinforcing fabric.
   4. Excavation, spoil handling and legal disposal.
   5. Dewatering within excavation using sumps, sump pumps, trash pumps, discharge piping, desilting and discharge using best management practices.
   6. Furnishing and installing butterfly valves including block, riser, box, and valve nut extension.
   7. Furnishing and installing backfill for all excavations, furnishing and installing temporary and permanent hot mix asphalt or concrete paving.
   8. Daily cleanup, dust control, record drawings and all incidentals required by these Specifications and Drawings.

10-1.04B(14) Bid Items 19 through 21: 6-, 8-, or 12-inch Gate Valve and Box

A. Bid Items 19 through 21 include payment for all work, equipment, and materials necessary to install isolation gate valves as shown on the Drawings complete in place.

B. Payment shall be "Each" and shall be full compensation for, but not limited to, the following:
   1. All submittals
   2. Coordination and protection of existing utilities including potholing.
   3. Sawcutting, removal and legal disposal of concrete or asphalt concrete pavement including pavement containing reinforcing fabric.
   4. Excavation, spoil handling and legal disposal.
   5. Dewatering within excavation using sumps, sump pumps, trash pumps, discharge piping, desilting and discharge using best management practices.
   6. Furnishing and installing gate valves including block, riser, box, and valve nut extension.
   7. Furnishing and installing backfill for all excavations, furnishing and installing temporary and permanent hot mix asphalt or concrete paving.
   8. Daily cleanup, dust control, record drawings and all incidentals required by these Specifications and Drawings.

10-1.04B(15) Bid Item 22: 4-inch Low-Point Blow Off Valve Assembly with Box

A. Bid Item 22 includes payment for all work, equipment, and materials necessary to install blow off as shown on the Drawings complete in place.

B. Payment shall be "Each" and shall be full compensation for, but not limited to, the following:
   1. All submittals
   2. Coordination and protection of existing utilities including potholing.
   3. Sawcutting, removal and legal disposal of concrete or asphalt concrete pavement including pavement containing reinforcing fabric.
   4. Excavation, spoil handling and legal disposal.
   5. Dewatering within excavation using sumps, sump pumps, trash pumps, discharge piping, desilting and discharge using best management practices.
   6. Furnishing and installing plug, cap, riser, box, and valve.
   7. Furnishing and installing backfill for all excavations, furnishing and installing temporary and permanent hot mix asphalt or concrete paving.
   8. Daily cleanup, dust control, record drawings and all incidentals required by these Specifications and Drawings.

10-1.04B(16) Bid Item 23: 1-inch Combination Air Valve Assembly with Cover and Bollards

A. Bid Item 23 includes payment for all work, equipment, and materials necessary to install combination air valve (CAV) as shown on the Drawings complete in place.

B. Payment shall be "Each" and shall be full compensation for, but not limited to, the following:
   1. All submittals
   2. Coordination and protection of existing utilities including potholing.
   3. Sawcutting, removal and legal disposal of concrete or asphalt concrete pavement including pavement containing reinforcing fabric.
   4. Excavation, spoil handling and legal disposal.
   5. Dewatering within excavation using sumps, sump pumps, trash pumps, discharge piping, desilting and discharge using best management practices.
   6. Furnishing and installing service saddle, corporation stop, pipe, concrete pad, valves, fittings, lockable enclosure, and all other necessary parts.
   7. Furnishing and installing sacrificial anode.

8. Furnishing and installing post-type utility markers.
9. Furnishing and installing backfill for all excavations, furnishing and installing temporary and permanent hot mix asphalt or concrete paving.
10. Daily cleanup, dust control, record drawings and all incidentals required by these Specifications and Drawings.

10-1.04B(17) Bid Items 24 and 25: 1-1/2- or 2-inch Water Service from Main Through Meter Valve

A. Bid Items 24 and 25 include payment for all work, equipment, and materials necessary to construct a water service as shown on the Drawings complete in place.

B. Payment shall be "Each" water service, regardless of length, and shall be full compensation for, but not limited to, the following:

1. All submittals
2. Coordination and protection of existing utilities including potholing.
3. Sawcutting, removal and legal disposal of concrete or asphalt concrete pavement including pavement containing reinforcing fabric.
4. Removing and stockpiling topsoil.
5. Trenching for open cut service.
6. Excavating bore pit and bore in service.
7. Spoil handling and proper disposal.
8. Connecting to the new or existing meter.
9. Replacing topsoil and replanting landscape areas.
10. Furnishing and installing the service saddle, corp stop or valve, tap the main and install service pipe and fittings, meter valve, and bushings.
11. Flushing, pressure testing, chlorinating and flushing service.
12. Furnishing and installing backfill for all excavations, furnishing and installing temporary and permanent hot mix asphalt or concrete paving.
13. Daily cleanup, dust control, record drawings and all incidentals required by these Specifications and Drawings.

10-1.04B(18) Bid Item 26: 2-inch Irrigation Service from Main Through Meter Valve

A. Bid Item 26 includes payment for all work, equipment, and materials necessary to construct a landscape irrigation water service as shown on the Drawings complete in place.

B. Payment shall be "Each" water service, regardless of length, and shall be full compensation for, but not limited to, the following:

1. All submittals
2. Coordination and protection of existing utilities including potholing.
3. Sawcutting, removal and legal disposal of concrete or asphalt concrete pavement including pavement containing reinforcing fabric.
4. Removing and stockpiling topsoil.
5. Trenching for open cut service.
6. Excavating bore pit and bore in service.
7. Spoil handling and proper disposal.
8. Connecting to the existing water service on the street side of the existing meter box.
9. Replacing topsoil and replanting landscape areas.

10. Furnishing and installing the service saddle, corp stop or valve, tap the main and install service pipe and fittings, meter valve, and bushings.
11. Flushing, pressure testing, chlorinating and flushing service.
12. Furnishing and installing backfill for all excavations, furnishing and installing temporary and permanent hot mix asphalt or concrete paving.
13. Daily cleanup, dust control, record drawings and all incidentals required by these Specifications and Drawings.

10-1.04B(19) Bid Items 27 through 30: 1-, 1-1/2-, or 2-inch Meter with Anode, Valve, Box and Lid for Irrigation or on an Existing Service (Case 1 or Case 2)

A. Bid Items 27 through 30 include payment for all work, equipment, and materials necessary to install a water meter with anode, valve, box, and lid as shown on the Drawings complete in place.

B. Payment shall be "Each" metered water service, regardless of length, and shall be full compensation for, but not limited to, the following:

1. All submittals
2. Coordination and protection of existing utilities including potholing.
3. Sawcutting, removal and legal disposal of concrete or asphalt concrete pavement including pavement containing reinforcing fabric.
4. Excavation for meter and box installation.
5. Spoil handling and proper disposal.
6. Furnishing and installing new meter box, lid, and appurtenances.
7. Furnishing and installing water meter, valve, and appurtenances.
8. Furnishing and installing sacrificial anodes.
9. Furnishing and installing backfill for all excavations, furnishing and installing temporary and permanent hot mix asphalt or concrete paving.
10. Daily cleanup, dust control, record drawings and all incidentals required by these Specifications and Drawings.
11. Coordination with property owner and residents.

10-1.04B(20) Bid Item 31: Locate and Expose Existing Service Valve

A. Bid Item 31 includes payment for all work, equipment, and materials necessary to locate and expose the existing service valve and valve/meter box as needed for meter installation and service upgrade under other work items as shown on the Drawings complete in place.

B. Payment shall be "Each" and shall be full compensation for, but not limited to, the following:

1. All submittals
2. Coordination and protection of existing utilities including potholing.
3. Investigation, exploration and use of locating equipment as needed to determine location of existing service, valve and box.
4. Sawcutting, removal and legal disposal of concrete or asphalt concrete pavement including pavement containing reinforcing fabric.
5. Trenching for open cut service.
6. Spoil handling and proper disposal.
7. Removing and resetting valve and/or meter box
8. Daily cleanup, dust control, record drawings and all incidentals required by these Specifications and Drawings.

10-1.04B(21) Bid Item 32: 2-inch Backflow Preventer Assembly

A. Bid Item 32 includes payment for all work, equipment, and materials necessary to construct a backflow preventer assembly complete in place.

B. Payment shall be "Each" and shall be full compensation for, but not limited to, the following:

1. All submittals
2. Coordination and protection of existing utilities including potholing.
3. Sawcutting, removal and legal disposal of concrete or asphalt concrete pavement including pavement containing reinforcing fabric.
4. Trenching for open cut service.
5. Spoil handling and proper disposal.
6. Furnishing and installing new pipe, valves, fittings, and appurtenances.
7. Furnishing and installing protective enclosure.
8. Furnishing and installing backfill for all excavations, furnishing and installing temporary and permanent hot mix asphalt or concrete paving.
9. Daily cleanup, dust control, record drawings and all incidentals required by these Specifications and Drawings.
10. Providing initial backflow certification testing and results demonstrating compliance.

10-1.04B(22) Bid Item 33: 1-inch Water Service and Sampling Station

A. Bid Item 33 includes payment for all work, equipment, and materials necessary to construct a water service and sampling station as shown on the Drawings complete in place.

B. Payment shall be "Each" regardless of length, and shall be full compensation for, but not limited to, the following:

1. All submittals
2. Coordination and protection of existing utilities including potholing.
3. Sawcutting, removal and legal disposal of concrete or asphalt concrete pavement including pavement containing reinforcing fabric.
4. Trenching for open cut service.
5. Spoil handling and proper disposal.
6. Furnishing and installing the service saddle, corp stop or valve, tap the main and install service pipe and fittings, meter cock and valve, and bushings.
7. Furnishing and installing new sampling station including all fittings and cover.
8. Furnishing, cleaning, and installing pipe, fittings, thrust blocks and anchors, and appurtenances.
9. Furnishing and installing sacrificial anodes.
10. Flushing, pressure testing, chlorinating and flushing service.
11. Furnishing and installing backfill for all excavations, furnishing and installing temporary and permanent hot mix asphalt or concrete paving.
12. Daily cleanup, dust control, record drawings and all incidentals required by these Specifications and Drawings.

10-1.04B(23) Bid Item 34: Install 1-inch Service and Stub for Pressure Transducer/Sensor

A. Bid Item 34 includes payment for all work, equipment, and materials necessary to construct a water service and stub for future pressure transducer installation by others as shown on the Drawings complete in place.

B. Payment shall be "Each" water service, regardless of length, and shall be full compensation for, but not limited to, the following:

1. All submittals
2. Coordination and protection of existing utilities including potholing.
3. Sawcutting, removal and legal disposal of concrete or asphalt concrete pavement including pavement containing reinforcing fabric.
4. Trenching for open cut service.
5. Spoil handling and proper disposal.
6. Furnishing and installing the service saddle, corp stop or valve, tap the main and install service pipe and fittings, meter cock and valve, and bushings.
7. Installing additional capped stub beyond meter box.
8. Furnishing, cleaning, and installing pipe, fittings, thrust blocks and anchors, and appurtenances.
9. Furnishing and installing sacrificial anodes.
10. Flushing, pressure testing, chlorinating and flushing service.
11. Furnishing and installing backfill for all excavations, furnishing and installing temporary and permanent hot mix asphalt or concrete paving.
12. Daily cleanup, dust control, record drawings and all incidentals required by these Specifications and Drawings.

10-1.04B(24) Bid Items 35, 36 and 37: Tie Into Existing Water Main at County Road 99D, Tie Into Existing Mains in Fairway Drive and at STA 'GCSA' 104+69 and for Upsize to 8-inch Mains

A. Bid Items 35, 36 and 37 includes payment for all work, equipment, and materials necessary to construct all required tie-ins to existing water mains as shown on the Drawings complete in place.

B. No measurement will be made. Payment shall be "Lump Sum" and shall be full compensation for, but not limited to, the following:

1. All submittals
2. Preparing a tie-in staging plan to the satisfaction of the City to obtain continuity of service minimizing the quantity and duration of service outages and protection of the City system from contamination with non-potable water from county well system or other sources.
3. Coordination and protection of existing utilities including potholing.
4. Potholing tie-in location in advance of construction to determine location and depth of tie-in point.
5. Sawcutting, removal and legal disposal of concrete or asphalt concrete pavement including pavement containing reinforcing fabric.
6. Excavation, spoil handling and legal disposal.
7. Removal and legal disposal of existing pipe, fittings, valves and appurtenances to connect to new pipe.
8. Installing water-tight cap or plug on open ends of existing pipe to be abandoned.
9. Coordination with City of Davis for main shut down.
10. Controlling water in trench so it does not back up into mains
11. Furnishing, cleaning, and installing temporary pipe, valves, fittings, backflow prevention, thrust blocks and anchors, and appurtenances as needed for staging of tie-ins and filling, testing and flushing water pipe systems.

12. Furnishing, cleaning, and installing permanent pipe, valves, fittings, thrust blocks and anchors, and appurtenances.
13. All hydrostatic testing and disinfection.
14. Furnishing and installing backfill for all excavations, furnishing and installing temporary and permanent hot mix asphalt or concrete paving.
15. Removing and replacing existing valve boxes where disturbed or displaced by water system reconfiguration, removals, tie-ins or related work.
16. Daily cleanup, dust control, record drawings and all incidentals required by these Specifications and Drawings.

10-1.04B(25) Bid Item 38: Disconnect and Cap Pipes from Existing Wells

A. Bid Item 38 includes payment for all work, equipment, and materials necessary to cap and abandon existing water main pipe as shown on the Drawings complete in place.

B. No measurement will be made. Payment shall be "Lump Sum" and shall be full compensation for, but not limited to, the following:

1. All submittals
2. Coordination and protection of existing utilities including potholing
3. Sawcutting, removal and legal disposal of concrete or asphalt concrete pavement including pavement containing reinforcing fabric.
4. Excavation, spoil handling and legal disposal.
5. Dewatering within excavation using sumps, sump pumps, trash pumps, discharge piping, desilting and discharge using best management practices.
6. Removal, handling, transport, and disposal of existing pipe and fittings.
7. Draining and installing water-tight cap or plug and abandoning in place existing pipe.
8. Furnishing and installing backfill for all excavations, and aggregate base for pavement subgrade, temporary and permanent paving.
9. Daily cleanup, dust control, record drawings and all incidentals required by these Specifications and Drawings.

10-1.04C SCHEDULE OF VALUES

A. Format: Identify each line item in the Schedule of Values with number and title of the major Specification sections. Submit typed schedule on 8-1/2 x 11-inch paper; Contractor's standard form or media-driven printout will be considered on request.

B. At the pre-construction meeting, submit a preliminary Schedule of Values to the Owner's Representative for review. The Contractor shall incorporate any review comments from the Owner's Representative, and submit a final Schedule of Values at least 21 days prior to submitting the first Application for Payment.

C. The Schedule of Values shall assign a fair, reasonable and equitable dollar value for each activity on the Contractor's construction schedule. The Schedule of Values shall include anticipated progress payments for each item in the bid schedule through the final payment. In addition, a detailed breakdown of lump sum prices shall be included in the Schedule of Values.

D. The Schedule of Values shall specifically indicate installed cost for materials and equipment for each bid and sub-bid item.

E. Each activity's assigned value shall consist of labor, equipment and materials cost and a prorata contribution to overhead and profit. Breakdown shall be so organized as to facilitate assessment of work and payment of subcontractors.

F. The sum of the assigned values shall equal the lump sum price of the activity.

G. If, in the opinion of the Owner's Representative or Owner, the Schedule of Values is not balanced, the Contractor shall provide documentation substantiating the cost allocations of those activities believed to be unbalanced. Cost allocation will be considered unbalanced if an activity on the construction schedule has been assigned a disproportionate allocation of labor, direct, or overhead and profit costs which result in progress payment request(s) which would create a condition where insufficient funds are available to complete the unfinished work. Upon request by Owner, support values shall be given with data that will substantiate their accuracy. Upon Owner's request, the Contractor shall submit additional detailed cost information.

H. Upon acceptance of the Schedule of Values, it shall be used as a basis for processing all progress payment requests.

10-1.04D PROGRESS PAYMENT REQUESTS

A. Submit Progress Payment Requests during the course of the project in conformance with the General Condition.

B. Submittal of progress record drawings of the project will be required at 25%, 50%, 75%, and substantial completion of the project. These submittals shall accompany the progress payment request and will be a condition of processing payment requests.

10-1.05 PROJECT MEETINGS

10-1.05A GENERAL

10-1.05A(1) Section Includes

A. Requirements for calling for and conducting meetings for the Work.

10-1.05A(2) General

A. Project meetings and conferences are an important administration and communication requirement of all project participants. Meetings will be conducted throughout the course of the construction to address issues related to the Work, review and coordinate progress of the Work, and to discuss other matters of common interest to project participants.

B. Meeting and conference locations and qualified participants will be determined by the Engineer and the Contractor based on the meeting agenda topics.

10-1.05A(3) Preconstruction Conference

A. Prior to the start of construction, the Engineer will schedule a meeting of the Contractor, Owner, and their respective representatives. The general purpose of the meeting will be to establish working relationships, begin coordination of construction matters, discuss the Work, and to review the pertinent features of the Contract. The duration of the preconstruction conference will take approximately 4 hours.

B. The agenda for the meeting will cover at least the following items, a more detailed agenda will be distributed at the meeting:

1. Organization of the Contractor's forces and personnel, including subcontractors and materials suppliers.
2. Lines of authority and channels and procedures for communication.
3. Contractor's construction schedule, including sequence of critical work.
4. Processing of shop drawings and other data that will be submitted to Owner for review.
5. Processing of change order requests and monthly applications for payment.
6. Procedures for quality control, housekeeping and related matters.

C. Contractor should be prepared to discuss the following topics:

1. Preliminary construction schedule and critical path.
2. Schedule of submittals and submittals needing short turn-around times.
3. Schedule of Values for construction payments.
4. Critical work sequencing.
5. Plans for mobilization, arrangement and use of staging and storage areas, use of site, location and arrangement of field offices, and site security.

D. Minutes of Meeting
   1. The Engineer will compile minutes of the meeting and distribute copies to all participants.

10-1.05A(4) Progress Meetings

A. Unless otherwise arranged, there will be a weekly progress meeting at a time and at an on-site location that is mutually agreed upon between the Contractor, Engineer and Owner.
   1. Meetings are to enable orderly project review during the progress of work.
   2. Engineer, Owner, Contractor's Superintendent, representatives of subcontractors, suppliers' representatives as may be needed, other Contractors working at the site, and other parties shall attend these meetings.
   3. Engineer will preside over the meeting and will compile and distribute minutes of the meeting.

B. The purpose of the weekly meetings is to coordinate the efforts of all concerned to result in smooth and coordinated progress towards completion of the overall project.

C. Contractor shall bring to each weekly meeting the updated 2-week "look ahead" schedule.

D. The Contractor will be required to address the following items at the weekly meeting:
   1. Work completed last week.
   2. Work anticipated next week.
   3. Log of submittals and Requests for Information.
   4. Contract document deficiencies or questions noted during prior week.
   5. Schedule status and corrective measures and procedures that are planned to place the project back on schedule, if such action is necessary.
   6. Report of any accidents, and any site safety issues that need to be addressed.

E. Other agenda items to be discussed include:
   1. Review and revise as necessary and approve minutes of previous meetings.
   2. Status of Requests for Information, Change Order Requests, submittals and shop drawings.
   3. Identify problems that impede planned progress.
   4. Other current business pertaining to the Work.

F. Revision of Minutes
   1. Unless published minutes are challenged in writing prior to the next regularly scheduled progress meeting, they will be accepted as properly stating the activities and decisions of the meeting.
   2. Persons challenging published minutes shall reproduce and distribute copies of the challenge to all indicated recipients of the particular set of minutes.
   3. Challenge to minutes shall be settled as priority item of "old business" at the next regularly scheduled meeting.

10-1.05A(5) Special Meetings

A. Any time during progress of the Work, the Owner and the Construction Manager shall have the authority to require the Contractor and any subcontractor, suppliers, or service providers to attend

job-site conferences on matters which require immediate or special attention. Any notice of such conference shall be duly observed and complied with by the Contractor and subcontractors, suppliers, or service providers without extra cost to Owner.

10-1.06 CONSTRUCTION SCHEDULE

10-1.06A GENERAL

10-1.06A(1) Section Includes

A. Procedures for preparing and revising the construction schedule used for planning and managing construction activities.

10-1.06A(2) Coordination with General Conditions

A. Prepare and submit a Preliminary Schedule within 5 days of Notice to Proceed.

B. The Contractor's execution of the Work shall begin based on the Preliminary Schedule accepted by the Engineer. As Work progresses, the Schedule shall be updated and resubmitted in accordance with the requirements of this Section.

10-1.06A(3) Use of Schedule

A. The schedule and subsequent updates provides a basis for determining the progress status of the project relative to the completion time, specific dates, and for determining the acceptability of the Contractor's progress payment estimates.

10-1.06B PRODUCTS (NOT USED)

10-1.06C EXECUTION

10-1.06C(1) Description

A. The Contractor shall prepare a time scale network schedule using a critical path method. A general guide for preparing such a schedule is contained in "The Use of CPM in Construction, a Manual for Contractors," published by the Associated General Contractors of America.

B. Completion time shall be shown on the schedule. Activities making up the critical path shall be identified.

C. No activity on the schedule shall have a duration longer than 21 days or assigned value greater than $50,000, except activities comprising only fabrication and delivery, which may extend for more than 21 days.

1. Activities that exceed these limits shall be divided into more detailed components.
2. The scheduled duration of each activity shall be based on the work being performed during the normal 40-hour workweek with allowances made for legal holidays and normal weather conditions.

10-1.06C(2) Submittal Procedures

A. Submit Preliminary Schedule within 5 days of Notice to Proceed. Submit the following items:

1. Two copies of the project schedule formatted to fit 11x17 inch sheets.
2. Electronic file of the schedule.

B. The Engineer will review the Preliminary Schedule to ascertain compliance with specified project constraints, compliance with milestone dates, reasonableness of durations and sequence, accurate inter-relationships and completeness.

C. Review comments will be transmitted to Contractor following completion of preliminary review.

D. Revise and resubmit schedule in accordance with written comments, or request joint meeting to resolve objections.

E. When schedule reflects the Engineer and Contractor's agreement of project approach and sequence, schedule will be accepted as the Base Schedule. Use the accepted Base Schedule for planning, organizing and directing the work and for reporting progress.

10-1.06C(3) Updating the Schedule

A. Submit an updated schedule with each Application for Payment.

B. Progress payment requests may not be processed by Engineer if updated schedule has not been submitted or if update is found unacceptable.

C. Prepare update using most recent accepted version of schedule including:

1. Actual start date of activities that have been started.
2. Actual finish date of activities that have been completed.
3. Percentage of completion of activities that have been started but not finished.
4. Actual dates on which milestones were achieved.

D. Submit narrative report in conjunction with updated schedule describing:

1. Activities added to or deleted from schedule. Identify added activities in manner distinctly different from original activity designations.
2. Changes in sequence or estimated duration of activities.
3. Current or anticipated problems and delays affecting progress, impact of these problems and delays and measures taken to mitigate impact.
4. Assumptions made and activities affected by incorporating change order work into the schedule.

10-1.06C(4) Two Week "Look Ahead Schedule"

A. In addition to the overall Construction Schedule, provide a "Look Ahead" schedule in bar chart format. Show work activities undertaken in the preceding week and the work activities that will be undertaken during the upcoming two weeks.

B. Prepare the Look Ahead schedule weekly and submit to the Engineer at the weekly construction progress meeting.

10-1.07 SUBMITTALS

10-1.07A GENERAL

10-1.07A(1) Summary

A. Requirements for the submittal of information that will enable determination of whether the Contractor's proposed materials, equipment or methods of work are in general conformance to the design concept and in compliance with the Contract Documents. All water system related submittals are subject to review and approval by both the City of Davis and the County of Yolo.

B. Furnish drawings, specifications, descriptive data, certificates, samples, test results, methods, schedules, manufacturer's installation instructions and other information as indicated.

10-1.07A(2) Contractor's Responsibilities

A. Contractor shall be responsible for the accuracy and completeness of the information contained in each submittal and shall assure that the materials and equipment incorporated into the Work, or the methods of performing the Work shall be as described in the accepted submittals.

B. Verify that all features of all products conform to the specified requirements. Submittal documents shall be clearly edited to indicate only those items, models, or series of equipment that are being submitted for review. Extraneous materials shall be crossed out or otherwise obliterated.

C. Coordinate submittals among subcontractors and suppliers. Ensure that there is no conflict with other submittals and notify the County Representative in each case where his submittal may affect

the work of another contractor or the Owner, including those submittals complying with unit responsibility requirements specified in applicable technical sections.

D. Coordinate submittals with the Work so that work will not be delayed. Coordinate and schedule different categories of submittals, so that one will not be delayed for lack of coordination with another. No extension of time will be allowed because of failure to properly schedule submittals.

E. Do not proceed with work related to a submittal until the submittal process is complete and the submittal has received a response "No Exceptions Taken" or "Make Corrections Noted."

F. Certify on each submittal document that the Contractor has reviewed the submittal, verified field conditions, and complied with the contract documents.

1. Include a copy of the specification section with addendum updates, all referenced and applicable sections, and each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements.
    a. Use check marks (✓) to denote full compliance with a paragraph as a whole.
    b. If deviations from the specifications are indicated and, therefore requested by the Contractor, underline each deviation and denote by a number in the margin to the right of the identified paragraph.
    c. The remaining portions of the paragraph not underlined will signify compliance on the part of the Contractor with the specifications.
    d. Include a detailed, written justification for each deviation.
2. Failure to comply with this paragraph is sufficient cause to reject the entire submittal.

10-1.07A(3) Review Costs

A. The Owner's cost for review of submittals for the same proposed materials, equipment or work will be apportioned as follows:

1. The cost of review of the initial submittal and the first revised submittal will be borne by the Owner.
2. The cost to review all additional revised submittals after the first revised submittal will be charged to the Contractor. The cost of review shall include, without limitation, administrative, design and engineering activities directly related to review of submittals.

10-1.07A(4) Submittal Index

A. Within 30 days of the Notice to proceed, submit a list, by specification section, of all submittals to be submitted.

B. Update and resubmit the submittal index on a monthly basis where additional submittals are identified, or as necessary

10-1.07A(5) Categories of Submittals

A. General

1. Submittals fall into two general categories;
    a. Submittals for review and comment require action by the County and City Representatives.
    b. Submittals that are primarily for information only do not require Engineer's approval.

B. Submittals for Review and Comment

1. Transmit submittals for review and comment to the County and City Representatives. The Engineer will review the submittal for compliance with the Contract requirements and will provide written comments regarding acceptability.

C. Submittals for Information Only

1. Where specified, furnish submittals to the County and City Representatives for information only. The Engineer may, at the Engineer's option, review and comment on any product data.
2. Incomplete or inadequate product data will be returned to the Contractor for resubmittal.

10-1.07A(6) Transmittal Procedures

A. General
   1. Transmit submittals regarding material and equipment under cover of a transmittal form, Contractor may provide transmittal form or request a copy of the form from the County and City Representatives.
   2. Use a separate form for each specific item, class of material, equipment, and items specified in separate, discrete sections, for which the submittal is required.
   3. Identify submittal documents common to more than one piece of equipment with all the appropriate equipment numbers.
   4. Make submittals for various items with a single form when the items taken together constitute a manufacturer's package or are so functionally related that expediency indicates checking or review of the group or package as a whole.
   5. Assign a unique sequential number on the transmittal form accompanying each item submitted.
   6. Use the following format for original submittal numbers: "XXX"; where "XXX" is the sequential number assigned by the Contractor.
   7. Use the following format for resubmittals: "XXX-Y"; where "XXX" is the originally assigned submittal number and "Y" is a sequential letter assigned for resubmittals, i.e., A, B, or C being the 1st, 2nd, and 3rd resubmittals, respectively. Submittal 25B, for example, is the second resubmittal of submittal 25.

B. Electronic Submittals
   1. Electronic submittals are preferred except as otherwise indicated.
   2. Prepare electronic submittals and Shop Drawings in electronic (*.pdf) format including half-sized and full-sized drawings, catalog information and other required submittal information.
   3. Break down submittals that are larger than 10 megabytes into smaller sections, using logical division points to create sections.
   4. Electronically bookmark electronic submittals greater than 30 pages in length by major submittal section to facilitate ease of navigation.

C. Paper copy submittals are an acceptable alternative to electronic submittals if the Contractor demonstrates, to the satisfaction of the County and City Representatives, that electronic submittals present a hardship.

D. Deviation from Contract
   1. If the Contractor proposes to provide material, equipment, or method of work that deviates from the project manual, so indicate under "Proposed Deviations" on the transmittal form accompanying the submittal copies.

E. Submittal Completeness
   1. Submittals that do not have all the information required to be submitted, including deviations, are not acceptable and will be returned without review.

10-1.07A(7) Submittal Content

A. Prepare submittals in compliance with individual Specification Sections and as indicated herein.

B. Shop Drawings:

1. Develop project-specific, scaled drawings to fully identify materials and products that will be provided and their relationship to other products that will be furnished and installed.
2. Do not utilize reproductions of the Contract Documents as the basis for the submittal.
3. Identify products, assemblies, equipment and systems.
4. Provide equipment identification numbers or tag numbers, wiring diagrams, and setting diagrams.
5. Identify critical dimensions.

C. Product Data:
1. Provide information necessary to demonstrate conformance with the specified requirements. Include performance curves, specifications, and wiring diagrams.
2. Product data may consist of manufacturer's standard catalog information and data sheets, marked to indicate the specific products that will be provided.
3. Provide supplemental information as necessary to fully demonstrate how products will be modified from the manufacture's standard products to meet the specification requirements.

D. Manufacturer's Instructions: Written or published information that establishes the manufacturer's recommendations, guidelines and procedures for handling and installation of products, equipment and assemblies.

E. Samples: Mount, display or package samples in a manner that will facilitate review and establish workmanship and quality of materials.

10-1.07A(8) Submittal Requirements

A. When the Contract Documents require a submittal, submit the specified information as follows:
1. Submittals for Review and Comment:
a. Electronic Submittal: Submit one electronic (*.pdf) submittal.
b. Paper Copy Submittal: If paper copy submittals are acceptable to the County and City Representatives, submit six (6) copies of all submitted information plus one reproducible original for review unless otherwise specified.
2. Submittals for Information Only:
a. Electronic Submittal: Submit one electronic (*.pdf) submittal.
b. Paper Copy Submittal: If paper copy submittals are acceptable to the Engineer, submit six (6) copies of all submittal information for review, unless otherwise specified.

10-1.07A(9) Review Procedures

A. General
1. The Engineer will review submittals within the processing time identified in paragraph "Processing Time" and return:
a. Electronic Submittal – a signed submittal response document, in (*.pdf) format.
b. Paper Copy Submittal – Two marked up copies of the submitted copies. The reproducible original will be retained by the Engineer.

B. Submittals for Review and Comment –
1. The returned submittal will indicate one of the following actions:
a. "NO EXCEPTIONS TAKEN" – The material, equipment or work method complies with the project manual.
b. "MAKE CORRECTIONS NOTED" – Limited corrections are required.
1) Provide a corrected copy where:

a) The information is to be included in the O&M data.
b) If requested by the Engineer.

c. "AMEND AND RESUBMIT" – The submittal is insufficient or contains incorrect data.

d. "REJECTED – SEE REMARKS" – The material, equipment, or work method does not comply with the project manual. Submittals with deviations that have not been identified clearly may be rejected.

2. For submittals marked "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED.

a. The Contractor may begin implementing the work method or incorporating the material and equipment covered by the submittal in accordance with any noted corrections.

3. For submittals marked "AMEND AND RESUBMIT" or "REJECTED – SEE REMARKS"

a. Contractor shall provide a typed letter responding to each of the Engineer's review comments with each resubmittal.

b. Except at its own risk, the Contractor shall not undertake the work covered by such submittals until a new submittal is submitted and returned marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED."

C. Submittals for Information Only

1. The returned submittal will indicate ACCEPTED FOR RECORD" if the submittal is complete and adequate.

2. County and City Representatives may return comments on information submittals to identify concerns with what was submitted, in such case, Contractor shall address concerns in writing and return a revised submittal.

10-1.07A(10) Processing Time

A. Prepare submittals and transmit to County and City Representatives for review in sufficient time to allow Engineer's review; manufacture, fabrication or assembly of materials and systems; and shipping of material to the site in time for installation in accordance with the Contractor's schedule.

B. Engineer's time for review will begin upon receipt of a complete and comprehensive submittal containing all required information.

C. Engineer will review submitted information and transmit a response to Contractor within 15 days after receipt, subject to the following:

1. In some instances, review times for specific submittals may be modified by the individual specification Section.

2. Resubmittals will be subject to the same review time.

D. No adjustment of Contract Time or Contract Price will be allowed due to delays in the progress of the Work that are caused by rejected submittals and subsequent resubmittals.

10-1.07A(11) Effect of Review of Contractor's Submittals

A. The purpose of submittals is to demonstrate how Contractor intends to conform to the Contract Documents and design concepts. Engineer is entitled to rely upon the accuracy and completeness of designs, calculations, or certifications made by licensed professionals whether or not a stamp or seal is required by the Contract Documents.

B. The review procedure is based on the Contractor's guarantee that all features and characteristics not requiring submittals conform to the contract documents.

C. Review of contract drawings, methods of work, or information regarding materials or equipment the Contractor proposes to provide, does not relieve the Contractor of its responsibility for the following:

1. Fulfilling the requirements of the Contract,

2. Proper operation of the equipment,
3. Correction of defective work

D. Reviews shall not be regarded as an assumption of risk or liability by the Engineer or the Owner.

E. A mark of "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED" means that the Owner has no objection to the Contractor, upon its own responsibility, using the plan or method of work proposed, or providing the materials or equipment proposed.

F. The Engineer's review of shop drawings, samples, or test procedures will be only for conformance with design concepts and for compliance with information given in Contract Documents. The Engineer's review does not extend to:

1. Accuracy of dimensions, quantities, or performance of equipment and systems designed by Contractor.
2. Contractor's means, methods, techniques, sequences, or procedures except when specified, indicated on the Drawings, or required by Contract Documents.
3. Safety precautions or programs related to safety which shall remain the sole responsibility of the Contractor.

G. Review of a separate item does not indicate approval of the assembly in which the item functions.

10-1.08 CONSTRUCTION STAKING AND SURVEYING

10-1.08A GENERAL

10-1.08A(1) Datum

A. Vertical and horizontal datum are based on the coordinates and benchmarks shown on the Drawings or as provided by County Representative prior to the start of construction. The Contractor is to locate and protect control points prior to starting the Work and preserve control points during construction. The Contractor shall re-establish all control points disturbed by its operations at no cost to County.

B. The Contractor shall establish other vertical and horizontal control from these reference points as required to properly layout and construct the Work. All connections shall be installed based on actual elevations of existing structures to which connections are made.

10-1.08A(2) Accuracy of Information

A. Dimensions for existing structures, piping, paving, and other nonstructural items are taken from the available information provided by the County and Utility Owners. The Contractor shall field verify dimensions and conditions in advance of any construction in the area. Any discrepancy between the field survey by the Contractor and the information indicated in the Contract Documents shall be immediately brought to County Representative’s attention by written notification.

10-1.08A(3) Layout and Measurement to be Performed by Contractor

A. Contractor is responsible for conducting field surveys required to lay out components of the Work at the proper alignment, elevation, grades, dimensions, and distances indicated on the Drawings.

B. The Contractor shall furnish stakes, equipment, tools, materials, and all labor as required for layout work.

10-1.08A(4) Protection of Existing Survey Monuments

A. Contractor shall be responsible for the protection of all existing survey monuments and/or other survey markers during construction.

B. All monuments or markers destroyed during construction shall be replaced by a licensed California Land Surveyor at the Contractor’s expense. The licensed California Land Surveyor shall prepare

and file a corner record with the County Surveyor for each monument which is destroyed and replaced at the Contractor's expense.

10-1.09 CONSTRUCTION FACILITIES AND UTILITIES

10-1.09A GENERAL

10-1.09A(1) Section Includes

A. Requirements for Contractor's temporary facilities at the job site and for the prosecution of the Work.

10-1.09A(2) Easements

A. Contractor shall confine equipment, materials storage and all construction activities within the easements shown on the Drawings where work is required within an easement.

10-1.09A(3) Contractor's Construction Office

A. Contractor may arrange and establish an office at the site at their own expense, but a site office is not required.

B. Temporary office will be considered as the headquarters of the Contractor's representative whom is authorized to receive drawings, instructions, or other communication or articles. Any communication given to the representative or delivered at Contractor's temporary office at the site in his absence is deemed to have been delivered to the Contractor.

C. Maintain copies of the Drawings, Specifications, and other Contract documents at Contractor's temporary office at the site and make these available for use at all times.

10-1.09A(4) Staging Area(s)

A. Before starting the work, submit a proposed plan and layout for all temporary offices, sanitary facilities, storage areas, temporary water service and distribution, and temporary power service and distribution.

B. Erect temporary security fencing and other security measures as necessary to protect equipment, materials, tools and personal belongings from damage or loss. Contractor is responsible for the security of the staging area.

C. Store only those materials and equipment that are related to the construction within the staging area.

D. Available staging areas are identified on the Plans. Those areas are on certain City-owned parcels of land. In order to use those staging areas, Contractor shall conform to all requirements for use of those parcels.

10-1.09A(5) Fences

A. Existing fences enclose existing facilities. While it may be necessary for the Contractor to remove some of the existing fences for installation of the proposed improvements, the Contractor's operations shall not reduce the present protection and security. If the present fences are removed, an equivalent temporary continuous perimeter protection shall be provided and new fence which matches the existing fence shall be installed to replace the existing fence prior to the completion of the work.

10-1.09A(6) Temporary Access Roads

A. Construct temporary access roads where access to various portions of the site is otherwise unavailable.

B. Temporary access roads shall be removed at the end of construction and all sites shall be returned to their original condition.

C. Where temporary access roads are installed over landscaped areas, ground shall be scarified and recompacted to approximately 80% compaction, then restored and replanted as necessary.

10-1.09B PRODUCTS (NOT USED)

10-1.09C EXECUTION

10-1.09C(1) Temporary Electric Power

A. Contractor shall make provisions to obtain temporary electric power for use during construction. The Contractor shall be responsible for obtaining a source of electric power for construction.

B. Cost of electric power shall be borne by the Contractor.

C. The temporary electric power installation shall meet the construction safety requirements of OSHA, state, and other governing agencies.

10-1.09C(2) Temporary Telephone Service

A. Provide telephone service at the construction site office. Cellular telephone service is acceptable.

10-1.09C(3) Temporary Sanitary Facilities

A. Provide toilet and wash-up facilities for the construction work force at the site of work.

B. Facilities shall comply with applicable laws, ordinances, and regulations pertaining to the public health and sanitation of construction field offices, dwellings, and camps.

10-1.09C(4) Temporary Water Supply

A. Use potable water for soil moisture conditioning, pipeline pressure testing and other construction uses.

B. Water from existing well system in subdivision shall not be used for consumption or pipeline testing.

C. Obtain approvals and authorizations from the City of Davis for use of water and pay all fees associated with consumption of the potable water.

D. Make the necessary connections to the public water supply and install all conveyance piping and truck filling facilities that are required to transport water for the work.

E. Temporarily install valves, flow meters, air gaps, backflow preventers and other appurtenances required by the owner of the public water distribution system to maintain the integrity of the existing water systems.

10-1.10 MOBILIZATION AND DEMOBILIZATION

10-1.10A GENERAL

10-1.10A(1) Mobilization

A. Mobilization shall consist of preparatory work and operations, including, but not limited to, those necessary for the movement of personnel, equipment, supplies, and incidentals to the site; for the establishment of all facilities necessary for work on the project; and for all other work and operations which must be performed, or costs incurred prior to beginning work, on the various items on the project site.

B. Mobilization shall also include the construction of temporary access ways; temporary fencing; and the necessary preparatory work required to allow for the safe and stable movement of all vehicles that are required to construct the improvements as shown.

10-1.10A(2) Demobilization

A. Demobilization shall consist of work and operations necessary to disband all mobilized items and clean up the site. The removal of all temporary access ways, signs, temporary fencing, and

temporary facilities or works shall also be included as part of demobilization. The restoration of surfaces to an equal or better than existing condition will be paid under a separate item.

10-1.11 TRAFFIC CONTROL

10-1.11A GENERAL

10-1.11A(1) Section Includes

A. Contractor furnished labor, materials, equipment, tools, and services necessary to provide access to the motoring and pedestrian public; and adequately safeguard the workers and public from construction hazards with a minimum of inconvenience.

B. Work includes but is not limited to the following:

1. Preparation of Traffic Control Plans (detailed drawings) and obtaining approval of Traffic Control Plans from the County.
2. Masking and restoring permanent signs and striping.
3. Erection and removal of temporary construction signs.
4. Installation and removal of temporary traffic control devices, including barriers and barricades, freeway ramp closure and detour implementation.
5. Coordinating work with all agencies having jurisdiction.

C. Nothing in these special provisions shall be construed as relieving the Contractor from its responsibility as provided in Section 7-1.03, "Public Convenience," and Section 7-1.04, "Public Safety," of Caltrans Standard Specifications.

10-1.11A(2) Referenced Sections

A. Section 10-1.07 – Submittals

10-1.11A(3) Project Specific Requirements

A. Lane closures during peak hours shall be limited to the extent possible.

B. At least one lane shall be open to traffic at all times. Flagged one-way traffic shall be used as needed to maintain traffic flow in each affected direction while work is being performed.

C. No detours will be allowed other than where noted on the Contract Plans.

D. Access to neighboring properties shall be provided at all times.

10-1.11A(4) Reference Standards

A. Comply with guidelines excluding payment sections of the latest editions of the following reference standards:

1. California Manual on Uniform Traffic Control Devices (CA MUTCD).
2. Caltrans Standard Specifications, most recent edition.
   a. Section 7-1.03 Public Convenience
   b. Section 7-1.04 Public Safety
   c. Section 12, Temporary Traffic Control
3. Caltrans Standard Plans, most recent edition.
4. CAL/OSHA, State of California Construction Safety Orders.
   a. Section 1599, Traffic Control for Public Streets and Highways.
   b. Section 1599, Flaggers.
5. OSHA, Code of Federal Regulations.
   a. Title 19, Part 1926, Construction Safety and Health Regulations.

b. Title 29, Part 1910, Occupational Safety and Health Standards.

B. In case of conflict between the above reference standards and the specifications contained herein, these specifications shall take precedence and be used in lieu of such conflicting portions.

10-1.11A(5) Submittals

A. Traffic Control Plans: According to the requirements of Section 10-1.07, submit, at least three (3) weeks prior to work, Traffic Control Plan drawings which conform to all requirements of these specifications, approved by the Count. Traffic Control Plans shall be provided for roadways and intersections affected by construction.

B. A traffic control plan shall include systems of closing traffic lanes in accordance with the details shown on State Standard Plan T-13, the provisions of Section 12, "Temporary Traffic Control," of the State Standard Specifications, and the CA MUTCD.

C. Traffic control plans shall be site specific. Standard plans may be referenced, but details shall be depicted on maps, images, or figures of actual road configurations at specific locations along the project. Photo copies of typical traffic control lane closure samples from the CA MUTCD, State Standard Plans or any other manuals will not be accepted.

D. All signs, signals, pedestrian and vehicle ramps, and barricades shall conform to the requirements of CAL/OSHA Construction Safety and Health Regulations. A Traffic Control Plan, following the requirements of the County, shall be submitted to the Engineer and agencies having jurisdiction for review and approval. Traffic Control Plan shall contain, but not be limited to the following:

1. Circulation and detour plans to minimize impacts on local street circulation during road closures.
2. Show the existing intersection lane configuration and the appropriate traffic control application for each approach. Location, placement, monitoring schedule and movement of all traffic control devices to be used to guide vehicles through and/or around the construction zone including, but not limited to, proper lane tapers, signs, flashing arrow boards, portable changeable message signs, "work ahead" and other advance warning signs, signals, pedestrian and vehicle ramps, barricades and flaggers.
3. For work in-between intersections, submit a typical traffic control plan for mobile operations to the agency having jurisdiction for review and approval. Mobile operations shall include at least two (2) shadow vehicles equipped with truck-mounted attenuators and arrow boards and shall follow the work vehicle. For streets with a posted speed limit of more than 40 mph, at least three (3) shadow vehicles equipped with truck-mounted attenuators and arrow boards shall follow the work vehicle. Advanced warning signs shall be placed along the roadway and shall be moved periodically as work progresses. The typical traffic control plan for mobile operations shall be applicable to all work in between intersections. Multiple typical traffic control plan mobile operations shall be submitted as required by the agency having jurisdiction.
4. For work within all other intersections, use a flagger to control the intersection in addition to the mobile operation. There shall be at least one (1) flagger assigned to each intersection approach.
5. Identification of truck routes that minimize truck traffic on local roadways and residential streets will be utilized to the extent possible.
6. Identification of detours for bicycles, where applicable, in all areas affected by project construction.
7. Provisions for pedestrian access through the work zone during construction. If the work impacts any pedestrian pathway such as sidewalks, curb ramps, and crosswalks, the traffic control plan shall include a pedestrian handling plan to direct pedestrians safely through the construction work zone. The pedestrian handling plan shall conform to the most current CA MUTCD and

State Standard plans and may include pedestrian detours, signs, temporary pedestrian path and ramps.

8. Sufficient staging areas for trucks accessing construction zones to minimize disruption of access to adjacent land uses, particularly at entries to onsite pipeline construction within residential neighborhoods.
9. Control and monitoring of construction vehicle movement through the enforcement of standard construction specifications by onsite inspectors.
10. Scheduling of truck trips outside the peak morning and evening commute hours to the extent possible.

E. The traffic control plans shall be submitted for all streets in the agency having jurisdiction as one package for review by the agency having jurisdiction; partial submittals may be rejected.

F. The contractor shall be responsible for coordinating development of the Traffic Control Plan with the County.

G. No work will be allowed on county roads until the Contractor obtains written approval of the proposed Traffic Control Plan from agencies having jurisdiction.

H. The temporary closure of a signalized intersection, when necessary, shall be done in accordance with a traffic control plan approved by the agency having jurisdiction prior to the start of work. Inform the Transportation Engineering Division of the agency having jurisdiction of the anticipated signal shutdown at least five (5) working days in advance of the work.

10-1.11A(6) Quality Assurance

A. Traffic Control Plans shall be prepared by a qualified traffic management/traffic control firm or California Licensed Civil or Traffic Engineer. Plans shall be stamped by a California Licensed Civil or Traffic Engineer if a third submittal is required to gain approval from the agency having jurisdiction.

B. The Traffic Engineer who prepared the Traffic Control Plans shall be available at any time during the life of the contract to modify the Traffic Control Detail if and as required by the agency having jurisdiction.

C. No changes or deviations from the approved Traffic Control Plans shall be made, except temporary changes in emergency situations, with prior approval of the Traffic Engineer, the Construction Manager, and all agencies having jurisdiction.

D. Any revisions to the traffic control plans shall be submitted by agency having jurisdiction 10 days in advance of the work.

10-1.11A(7) Required Notification

A. Notify the following agencies and entities at least 48 hours prior to lane, roadway or ramp closures, reopenings, or partial obstruction of roadways.

1. City of Davis Fire Department
2. Yolo County Sheriff's Office
3. Yolo County Public Works
4. Yolo Emergency Communications Agency
5. Waste Management (Garbage Collection)
6. Postal Service

B. Coordinate construction with facility owners or administrators of sheriff and fire stations (including all fire protection agencies), transit stations, hospitals, and schools. Facility owners or operators shall be notified in advance of the timing, location, and duration of construction activities and the locations of detours and lane closures.

10-1.11B PRODUCTS

10-1.11B(1) Traffic Control Devices

A. All traffic control devices shall conform to the provisions in Caltrans Standard Specifications, Section 12, "Temporary Traffic Control," and to the CA MUTCD and the agency having jurisdiction.

B. Included, but not limited to, are flag units, construction signs, channelizing devices, barricades, delineators, and lighting devices.

C. All signs which are to convey their messages during darkness shall be reflectorized or illuminated.

D. No signs or supports shall bear any commercial advertising.

E. Portable flashing beacons shall conform to Caltrans Standard Specifications 12-3.31.

10-1.11C EXECUTION

10-1.11C(1) Placement of Traffic Control Devices

A. Each vehicle used to place, maintain and remove components of a traffic control system on multilane roads shall be equipped with a Type II flashing arrow sign which shall be in operation when the vehicle is being used for placing, maintaining, or removing the components. Vehicles equipped with a Type II flashing arrow sign not involved in placing, maintaining, or removing the components when operated within a stationary type lane closure shall only display the caution display mode. The sign shall be controllable by the operator of the vehicle while the vehicle is in motion.

B. Store all equipment and materials in designated contractor staging areas or adjacent to the worksite, such that traffic obstruction is minimized.

C. Implement all roadside safety protocols. Advance "Road Work Ahead" warning and speed control signs (including those informing drivers of state legislated double fines for speed infractions in a construction zone) shall be posted to reduce speeds and provide safe traffic flow through the work zone. All excess and unsuitable material resulting from the Contractor's operation shall be removed as it develops and before the end of each workday.

D. Whenever vehicles or equipment are parked on the shoulder within 6 feet of a traffic lane, the shoulder area shall be closed with fluorescent traffic cones or portable delineators placed on a taper in advance of the parked vehicles or equipment and along the edge of the pavement at 25-foot intervals to a point not less than 25 feet past the last vehicle or piece of equipment. A minimum of 9 cones or portable delineators shall be used for the taper. A W20-1 (Road Work Ahead) or W21-5 (Shoulder Work) sign shall be mounted on a portable sign stand with flags.

E. Use portable changeable message signs to provide advance notice of lane closures. All lane closures will require the placement of Changeable Message Signs (CMS). Messages shall be approved by the agency having jurisdiction. CMS shall be in place and operational at least two weeks in advance of construction.

10-1.11C(2) Maintenance of Traffic Control Devices

A. If any component of the traffic control system is displaced, or ceases to operate or function as specified from any cause, during the progress of the work, immediately repair the component to its original condition or replace the component, and shall restore the component to its original location.

10-1.11C(3) Removal of Traffic Control Devices

A. When lane closures are made for work periods only, at the end of each work period, all components of the traffic control system, except portable delineators placed along open trenches or excavations adjacent to the traveled way, shall be removed from the traveled way and shoulder. If the Contractor

so elects, the components may be stored at selected central locations, approved by the agency having jurisdiction.

10-1.11C(4) Access to Adjacent Properties

A. Provide and maintain access to adjacent properties at all times. Notify homeowners/occupants along the proposed construction route.

B. Fire hydrants on or adjacent to the work shall be kept accessible to firefighting equipment at all times.

C. Temporary provisions shall be made by the Contractor to assure the use of sidewalks and the proper functioning of all gutters, sewer inlets and other drainage facilities.

10-1.11C(5) Street Closure

A. No streets may be closed without first obtaining approval, in writing, from the County. If permission is granted, it shall be the Permittee's responsibility to notify the agencies/departments in Paragraph 1.11A(7) prior to closing the street.

B. Request for street closure shall include detour and signage plans.

10-1.11C(6) Traffic Coordination with Other Contractors

A. Nothing herein shall be construed to entitle the Contractor to the exclusive use of any public street, alleyway, or parking area during the performance of the work hereunder, and the Contractor shall so conduct its operations as not to interfere unnecessarily with the authorized work of utility companies or other agencies in such streets, alleyways, or parking areas.

B. Coordinate the traffic routing work with that of other forces working in the same or adjacent areas.

10-1.11C(7) Construction Parking Control

A. Roadside parking shall be removed in accordance with the Traffic Control Plan. Removal of roadside parking shall be minimized.

B. Make arrangements directly with local authorities to keep the working area clear of parked vehicles.

C. The Contractor may prohibit stopping in parking lanes where and when necessary in order to gain access to the work to provide the required traffic lanes in county streets and parking areas.

D. Coordinate with County Public Works Department for the location of "No Stopping" and "No Parking" signs.

E. At least one (1) week in advance of construction, furnish and place, where approved by County Representative, portable "TOW AWAY – NO STOPPING" signs. The dates and times of parking removal shall be posted on the signs.

F. Contractor is responsible for ensuring signs stay posted. "No Parking" signs shall be posted at a minimum spacing of 100 feet on portable barricades, delineators or similar devices furnished by the Contractor. In addition, a minimum of one (1) "No Parking" sign shall be posted between all driveways where on-street parking is normally allowed. Posting of "No Parking" signs will not be allowed on trees, sign posts, fences, etc.

G. All "No Parking" signs shall list the anticipated dates of work. Dates posted on all "No Parking" signs shall be limited to provide a maximum two-day construction window unless otherwise authorized by the Engineer. If the work is not performed during the timeframe indicated on the "No Parking" signs, the work shall be rescheduled with at least five (5) working days advance notice. Leave the streets open to traffic until just prior to starting the work, and provide all barricades, signs and traffic control measures necessary to protect the work. The Contractor, at his expense, will perform all re-posting of "No Parking" signs and re-notification of business and residents as a result of his failure to meet the posted schedule.

H. Any delays caused by failure of the Contractor to adhere to the approved schedule will be at the Contractor's sole expense. No additional compensation will be allowed for costs resulting from said delays.

I. Notify Yolo County Sheriff of all parking violators who require tow away from construction areas.

J. Construction equipment not actively engaged in the work and employee vehicles shall not be parked in the vicinity of the work in such a manner as to further restrict or obstruct traffic flow.

K. Vehicles and equipment in continuous or frequent use may be operated or parked in the same traffic lane as the work obstruction.

10-1.11C(8) Construction Signing

A. All construction area signs shall conform to Caltrans Standard Specifications 12-3.11.

B. Sign spacing shall conform to the CA MUTCD.

C. Signs normally shall be installed immediately before work is to commence and must be removed immediately after work is complete. If at any time a sign is not required, it shall be covered or removed.

D. The Contractor shall be responsible for the placement of advisory signs to inform the public of any street closure, detour, or construction affecting traffic at least 7 days before the closure or other significant disruption of normal traffic flow.

E. Existing roadside signs conflicting with the construction area signs shall be either removed and reset upon completion of work or securely covered.

F. After the application of crack seal material, "Fresh Oil" (W21-2) signs shall be placed at the limits of work.

10-1.11C(9) Illumination

A. Provide sufficient visibility on a 24-hour basis to approaching traffic whenever a street is closed partially or completely. Ensure that sufficient illumination is provided by means of portable flashing beacons, floodlights, or other similar devices. Mount all lighting fixtures in a manner which precludes glare to approaching traffic.

B. All barricades and obstructions shall be illuminated at night, and all lights shall be turned on from sunset until sunrise.

C. Arrow boards or other traffic control devices and lighting which will operate outside of the normal working hours shall be battery-operated. The use of gas-fired generators during nonworking hours will not be allowed.

10-1.11C(10) Flagging

A. Flaggers shall be required:

1. Where workers or equipment intermittently block a traffic lane.
2. When trucks or equipment enter or leave the work site from an adjacent traffic lane
3. Where plans or permit allow the use of one lane for two directions of traffic.
4. Wherever the safety of the public and/or workers determine there is a need.

B. Flagging shall be carried out in accordance with Caltrans Standard Specifications and the California Manual on Uniform Traffic Control Devices (California MUTCD). All flagging costs shall be considered as included in pay items for traffic control.

10-1.11C(11) Pedestrian Safety and Bicycle Access

A. Maintain safe and adequate pedestrian zones and public transportation stops as well as provide pedestrian crossings at intervals not to exceed 300 feet within the work zone.

B. When the construction area crosses a crosswalk, the crosswalk shall be barricaded and sign "No Ped Crossing Use Crosswalk" posted.

C. Maintain safe pedestrian and bicycle access and circulation during project construction. If construction activities encroach on a bicycle lane, advance warning signs (e.g., "Bicyclists Allowed Use of Full Lane" and/or "Share the Road") will be posted that indicate bicycles and vehicles are sharing the lane. If construction activities encroach on a sidewalk, safe crossings and appropriate signage will be provided for pedestrians.

10-1.11C(12) Night Work

A. No night work shall be permitted unless requested in writing by the Contractor and approved in writing by the agency having jurisdiction. In addition to schedule information traffic control and detour plans for specific locations shall be part of the Contractor's request for night work.

B. For all night work locations approved in writing, provide advanced special message signs placed at least seven (7) days prior to closing the intersection, but not more than fourteen (14) days in advance of the intersection closure. The advanced special message sign shall state the anticipated closure dates and times as shown on the plans. Notify the agency having jurisdiction not less than fourteen (14) calendar days prior to installing the advance intersection closure warning signs.

C. The Contractor shall be responsible for maintaining accurate and timely information on the advanced special message signs. The signs, when no longer required or when the information becomes outdated, shall be immediately covered or removed, or the sign message shall be updated.

10-1.12 ENVIRONMENTAL CONTROLS

10-1.12A GENERAL

10-1.12A(1) Section Includes

A. Environmental controls to be maintained during construction.

10-1.12A(2) Applicable Laws and regulations

A. Comply with applicable Federal, State and local environmental, health and safety laws and regulations.

10-1.12A(3) Site Cleanliness

A. Maintain work sites, staging areas, public roadways and private property clean and free of rubbish and debris. Remove materials and equipment from the site when they are no longer necessary for the Work.

B. Keep buildings that are occupied by the Contractor clear of refuse and debris and in a reasonably neat condition.

C. Upon completion of the work and before final acceptance, clear work areas of equipment, unused materials, and rubbish to present a clean and neat appearance.

10-1.12A(4) Hazardous Materials

A. Handle paints, solvents, and other construction materials with care to prevent contaminants from entering into sewers, storm drains, surface waters, or soils.

B. Develop an emergency response plan for spills of sewage, paint, oil, and other hazardous materials.

C. In the event of a spill, immediately notify the Engineer, Owner and jurisdictional agencies. Take proper measures to clean up spills of hazardous materials in accordance with the emergency response plan, State, Federal, and local regulations and manufacturer's recommendations.

10-1.12A(5) Air Pollution Control

A. Contractor shall not discharge smoke, dust, and other contaminants into the atmosphere that violate the air pollution regulations for the area.

B. Do not idle internal combustion engines for prolonged periods of time.

C. Minimize dust nuisance by cleaning, sweeping and sprinkling work areas, exposed soil, and haul roads with water or by powered brushing.

10-1.12A(6) Noise Control

A. Comply with local controls and noise level rules, regulations, and ordinances which apply to any work performed pursuant to the Contract. If the requirements of this Section are more restrictive than those of the local regulations, the requirements of this Section shall govern.

B. Minimize noise from construction equipment.

1. Whenever possible, utilize construction equipment powered by electric motors rather than diesel or gas driven engines.
2. Locate construction equipment such as compressors and generators as far from sensitive receptors as feasibly possible. Erect temporary sound blankets around noisy equipment to mitigate noise propagation.
3. Equip internal combustion engines with a muffler and provide a noise enclosure around stationary equipment such as engine-driven generators, welders, compressors, and pumps. Use "quiet package" and "hush" equipment.
4. Do not start-up machines or equipment prior to or after the specified construction work hours.

C. Noise Complaints: Should a specific noise impact complaint occur, Engineer has the prerogative to direct Contractor to implement one of the following noise mitigation measures at Contractor's expense:

1. Relocate stationary construction equipment away from the affected property.
2. Shut off idling equipment.
3. Reschedule construction operations to avoid periods of noise annoyance identified in the complaint.
4. Install temporary or portable acoustic barriers around stationary construction noise sources.
5. Operate electric powered equipment using utility power.

D. Amplified sounds such as telephone, loudspeakers, and other forms of loud communication that constitute a nuisance and potential disturbance shall not be used.

10-1.12A(7) Dirt and Mud Control

A. Contractor is responsible for preventing dirt, mud, and debris from accumulating on streets, sidewalks, parking areas, or other paved surfaces and for maintaining the cleanliness of these areas.

1. Track Out: Clean vehicle tires of mud and dirt before exiting the site.
2. Cover all dump truck loads and other loads that may result in debris falling from the vehicle.
3. Sweeping Paved Areas:
   a. Maintain cleanliness of paved areas used by the Contractor for the duration of the project.
   b. Sweep paved areas that have been used since the previous cleaning on at least a weekly basis, or more frequently when directed by the Engineer. Utilize regenerative air or vacuum pickup sweepers together with proper dust control methods to remove sediment, dust, dirt, and other matter from paved areas. Do not use excessive water resulting in mud on public streets.

10-1.12A(8) Oil Spill Prevention and Control

A. Store fuel and oil in accordance with requirements of the Uniform Fire Code and applicable National Fire Protection Association standards.

B. Assume responsibility for the prevention, containment, and cleanup of spilled oil, fuel, and other petroleum products used in the Contractor's operations. Prevention, containment and cleanup costs shall be borne by the Contractor.

C. Periodically inspect fuel hoses, lubricating equipment, hydraulically operated equipment, oil drums, and other devices for drips, leaks or signs of damage. Maintain and properly store to prevent spills and vandalism.

D. Construct dikes around storage tanks, or locate tanks to prevent spills from escaping to surface waters or drainage ditches.

E. Remove oils on land using sand, clay, sawdust or other absorbent material and dispose in an acceptable manner. Store waste materials in drums or other leak proof containers after cleanup and during transport to disposal.

10-1.13 STORM WATER QUALITY CONTROLS

10-1.13A GENERAL

10-1.13A(1) Summary

A. Requirements for the compliance with the General Permit for Discharges of Storm Water Associated with Construction Activity in the State of California.

10-1.13A(2) Requirements

A. Dischargers whose projects disturb 1 or more acres of soil or whose projects disturb less than 1 acre but are part of a larger common plan of development that in total disturbs 1 or more acres, are required to obtain coverage under the General Permit for Discharges of Storm Water Associated with Construction Activity Construction General Permit Order 2009-0009-DWQ adopted on September 2, 2009. Construction activity subject to this permit includes clearing, grading and disturbances to the ground such as stockpiling, or excavation.

B. The appropriate Regional Water Quality Control Board (RWQCB) enforces the General Permit. Coverage under a General Permit requires the electronic filing of all Permit Registration Documents (PRDs), Notices of Termination (NOT), changes of information, annual reporting and other compliance documents through the State Water Board's Stormwater Multi-Application and Report Tracking System (SMARTS) website.

C. Construction activity includes, but is not limited to: clearing, grading, demolition, excavation, construction of new structures, pipelines and reconstruction of existing facilities involving removal and replacement that results in soil disturbance. This includes construction access roads, staging areas, storage areas, stockpiles, and any off-site areas which receive run-off from the construction project such as discharge points into receiving waters.

D. While the County will be responsible to the RWQCB for compliance with the permit, the County will require the Contractor to provide the detailed planning and compliance activities required insofar as they would potentially affect the Contractor's methods and means of performing the Work.

E. If a violation of the permit is due to the Contractor's actions or inactions and a fine is assessed, the Contractor shall be responsible for the fine.

F. A copy of the Fact Sheet for the General Permit is available on the SWRCB website at: http://www.swrcb.ca.gov/water_issues/programs/stormwater/.

10-1.13A(3) Responsibilities

A. County's Responsibilities

1. A County staff person will be designated the Legally Responsible Person (LRP) who will electronically file Permit Registration Documents (PRDs) prior to commencement of construction activity.
2. PRDs will be filed by the County but shall be prepared by the Contractor. PRDs consist of:
   a. Notice of Intent (NOI)
   b. Risk Assessment
   c. Site Map
   d. Storm Water Pollution Prevention Plan (SWPPP)
   e. Annual Fee
   f. Signed Certification Statement
3. A County staff person will be the Legally Responsible Person (LRP) who will electronically file the following documents which may be prepared by others:
   a. Notices of Termination (NOT)
   b. Changes of Information
   c. Annual Reporting
   d. Other Compliance Documents
4. County will pay fees associated with filing NOI and annual reports.
5. County will furnish the Contractor with base maps of a suitable scale in order to prepare required documents.

B. Contractor's Responsibilities

1. Comply with the SWRCB, RWQCB, County, and other local agency requirements regarding stormwater management, inspection and monitoring.
2. Be responsible for meeting the requirements of the General Permit except as specifically noted otherwise herein.
3. Submit all documents and reports in electronic format suitable for the County to upload to the SMARTS website.
4. Prepare a SWPPP and submit the SWPPP for County review at least 30 days prior to any soil disturbing construction. The SWPPP shall meet the following requirements:
   a. SWPPP shall be prepared by a Qualified SWPPP Developer (QSD) as defined in Section VII of the General Permit.
   b. The SWPPP and each amendment to the SWPPP must be signed by the QSD.
   c. SWPPP shall meet the requirements of Section XIV of the General Permit and meet the following objectives:
      1) All pollutants and their sources, including sources of sediment associated with construction, construction site erosion and all other activities associated with construction activity are controlled;
      2) Where not otherwise required to be under a Regional Water Quality Control Board (RWQCB) permit, all non-stormwater discharges are identified and either eliminated, controlled, or treated;
      3) Site BMPs are effective and result in the reduction or elimination of pollutants in stormwater discharges and authorized non-stormwater discharges from construction

activity to the Best Available Technology/Best Control Technology (BAT/BCT) standard;

4) Calculations and design details as well as BMP controls for site run-on are complete and correct.
5) Stabilization BMPs installed to reduce or eliminate pollutants after construction are completed.
6) Identify post-construction BMPs, which are those measures to be installed during construction that are intended to reduce or eliminate pollutants after construction is completed.
7) Identify and provide methods to implement BMP inspection, visual monitoring, Rain Event Action Plan (REAP) and Construction Site Monitoring Program (CSMP) requirements to comply with the General Permit.

d. Amend and update the SWPPP whenever there is a change in construction or operations which may affect the discharge of pollutants to storm water.

5. Provide information and certification to the County as necessary to complete the NOI.
6. Make the SWPPP available at the construction site during working hours, and make it available upon request by a State or Municipal worker.
7. Designate a Qualified SWPPP Practitioner (QSP)
   a. Ensure all BMPs are implemented by a QSP.
   b. QSP is responsible for non-storm water and storm water visual observations, sampling and analysis.
   c. QSP shall meet the certification requirements of Section VII of the General Permit.
8. Install, construct, implement, monitor, maintain and remove upon completion all of the BMPs and other pollution prevention measures.
9. Implement the Rain Event Action Plan identified in the SWPPP 24 hours in advance of any the predicted precipitation event.
10. Implement the Construction Site Monitoring Plan (CSMP) developed in the SWPPP for the specific Risk Level of the project. Retain records of all monitoring information and copies of all reports and submit to the County.
11. Submit to the County all Non-Compliance reporting required by the General Permit including but not limited to:
    a. Numeric Action Level (NAL) exceedances.
    b. Numeric Effluent Limitation (NEL) Violation Report.
    c. Self-reporting of any other discharge violations
    d. Discharges which contain a hazardous substance in excess of reportable quantities established in 40 CFR §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.
12. Prepare the annual compliance report and submit to the County 15 days prior to September 1 of each year. Annual report shall comply with the requirements of Section XVI – Annual Reporting Requirements of the General Permit including but not limited to:
    a. Sampling and analysis results including laboratory reports, analytical methods and reporting limits and chain of custody forms (Risk Levels 2 and 3);
    b. Corrective actions and compliance activities, including those not implemented;
    c. Violations of the General Permit;

d. Date, time, place, and name(s) of the inspector(s) for all sampling, inspections, and field measurement activities;

e. Visual observation and sample collection exception records; and

f. Training documentation of all personnel responsible for General Permit compliance activities.

13. Provide the Engineer the names and 24-hour phone numbers for parties responsible for implementing, monitoring, inspecting and maintaining the SWPPP.

14. Contractor shall be bound to the conditions on the Notice of Intent (NOI) that will be filed by the County and will be responsible for all costs associated with the implementation of the Plan including all fines, damages and job delays incurred due to failure to implement the requirements of the General Permit.

15. Notify the Engineer immediately following a request from any regulatory agency to enter, inspect, sample, monitor or otherwise access the Project Site or its records.

16. Take the proper actions to prevent stormwater coming into contact with contaminants and sediments from migrating offsite or entering storm sewer drainage systems. Take immediate action if directed by the Engineer or if the Contractor observes contaminants and/or sediments entering the storm drainage system, to prevent further stormwater from entering the system.

17. Provide information and certification to the County as necessary to complete the NOT.

10-2 WATER SYSTEM

10-2.01 PLANT-MIXED 2-SACK CEMENT-SAND SLURRY

10-2.01A GENERAL

10-2.01A(1) Section Includes

A. Requirements for Plant-Mixed 2-sack Cement-Sand Slurry (Cement Sand Slurry) as backfill material in specific locations.

10-2.01A(2) Referenced Sections

A. Section 10-1.07 – Submittals

10-2.01A(3) Definition

A. Plant-Mixed 2-sack Cement-Sand Slurry (Cement Sand Slurry): A highly flowable, lean concrete mix consisting of a mixture of cement, fly ash, densely graded mineral aggregates, water and admixtures. Characteristics include:
   1. Capable of freely flowing to fill excavations and voids without compaction or other additional effort.
   2. Used in trenches and for backfill adjacent to structures where clearance is limited, and in other areas specifically identified on the Drawings or specified.
   3. Low permeability to prevent migration of adjacent fines into the set mix.
   4. Easily excavated after curing with minimum risk of damage to buried utility.

10-2.01A(4) Submittals

A. Comply with Section 10-1.07.

B. Mix Design: Identify name and/or number of the mix design. Provide the proportions and gradations of materials proposed for Cement-Sand Slurry.

C. Certified test results for compressive strength.

10-2.01A(5) Quality Assurance

A. Demonstrate that the Cement-Sand Slurry mix meets the specified requirements, including compressive strength.

10-2.01B PRODUCTS

10-2.01B(1) General

A. Cement-Sand Slurry Mix: A mixture of Portland cement, fly ash, aggregate, water, and admixtures that produce a material of controlled density and of low compressive strength capable of filling all spaces between the pipe, the bedding and the trench walls.

10-2.01B(2) Materials

A. Cement: Conforming to ASTM C150, Type II or III with total alkali content not more than 0.8 percent.

B. Water: Clean, potable water.

C. Fly Ash
   1. Mix Designs used for Pipe Bedding and Trench Backfill: Class C in conformance with ASTM C618.
   2. Mix Designs used for Backfill of Excavations: Class F in conformance with ASTM C618.

D. Aggregate Materials

1. Sand conforming to the following gradation:

Sieve Size	Percentage Passing
3/8 inch	100
No. 4	40-100
No. 100	10-40
No. 200	0-5

10-2.01B(3) Design Requirements

A. Cement Content: 188 pounds of cementitious material per cubic yard.

B. Use fly ash to improve flow-ability in accordance with Caltrans Standard Specifications.

C. Compressive Strength Requirements

1. Mix Designs used for Pipe Bedding and Trench and Excavation Backfill: Compressive strength at 28 days between 150 psi and 600 psi as determined in accordance with ASTM D4832.

10-2.01B(4) Consistency and Mixing

A. Consistency: Similar to that of a thick liquid so that it flows readily and fills spaces and voids around pipes and structures.

B. Slump: Between 6 inches and 8 inches when tested in accordance with ASTM C143.

C. Uniform consistency and appearance.

D. Mixing Method and Time: As required to produce a uniform mixture of cement, fly ash, aggregate, admixtures, and water.

10-2.01B(5) Measurement of Materials

A. Use weighing equipment to determine the amount of cement, fly ash, and aggregate entering into each batch. Where batches are proportioned to contain an integral number of conventional sacks of cement, and the cement is delivered at the mixer in the original unbroken sacks, the weight of the cement contained in each sack may be taken without weighing as 94 lbs.

B. Use a suitable water meter or other acceptable method of measuring the quantity of water entering the mixer.

10-2.01C EXECUTION

10-2.01C(1) Placement

A. Thoroughly settle and consolidate Cement-Sand Slurry as the material is placed in excavations. Fill the entire depth of the layer that is being consolidated, into a dense, homogeneous mass, filling all spaces and voids and bringing only a slight excess of water to the exposed surface. Place and consolidate Cement-Sand Slurry by means that will not cause segregation of the mix.

B. Do not place Cement-Sand Slurry under the following conditions:

1. When the air temperature is below 40 degrees Fahrenheit.
2. When the excavation contains water or when the bottom or walls of the excavation are frozen or contain frozen material.

C. Prevent flotation of pipes by placing Cement-Sand Slurry in two or more lifts, with each lift reaching an initial set before the succeeding lift is placed. Correct any flotation and displacement of pipelines.

D. Placement of Cement-Sand Slurry in Excavations: Limit lift thickness to 10 feet, place subsequent lifts after Cement-Sand Slurry has achieved the minimum specified compressive strength.

10-2.01C(2) Protection of Cement-Sand Slurry

A. Protect Cement-Sand Slurry from equipment, traffic and backfilling operations until the surface has achieved an initial set and has hardened enough to develop a minimum penetration number of 650 when tested in accordance with ASTM C403.

B. If the trench backfill is not to be placed over the Cement-Sand Slurry within eight hours after Cement-Sand Slurry placement, place a 6-inch layer of moist backfill over the Cement-Sand Slurry.

10-2.02 SUBSURFACE INVESTIGATIONS

10-2.02A GENERAL

10-2.02A(1) Section Includes

A. Requirements for subsurface investigations for locating existing utilities and points of connection to existing systems

10-2.02A(2) Referenced Sections

A. Section 10-1.07 – Submittals

10-2.02A(3) Submittals

A. Comply with Section 10-1.07.

B. Submit completed subsurface investigation report.

10-2.02B PRODUCTS (NOT USED)

10-2.02C EXECUTION

10-2.02C(1) General

A. Contact Underground Services Alert and have existing utilities marked prior to performing field investigations.

B. No additional compensation will be provided for locating utilities whether or not the utility is shown with reasonable accuracy on the Drawings.

C. Survey of existing utility field locations shall be conducted by a firm or individual that possesses a valid state registration for land surveying. Provide survey information using the same basis used for the Project.

10-2.02C(2) Field Investigations

A. Perform field investigations prior to preparation of Shop Drawings for underground piping, and prior to excavation for installation of any underground facilities.

B. Field locate existing underground utilities and other interferences shown on the Drawings or marked by USA and facilities where connections will be made as part of the Work. At a minimum, locate the following existing underground facilities:

1. Crossing utilities up to 2 feet beneath the proposed utility or structure subgrade.
2. Parallel utilities within 5 feet of the nearest trench wall of proposed utility or structure. Locate parallel utilities at a minimum every 100 feet. Decrease the spacing as necessary to accommodate fluctuations in the alignment of the existing utility.
3. Proposed connections to existing underground utilities or facilities.
4. Any other existing underground utility or facility that may affect the installation of the proposed underground facilities.

C. Determine the following properties of each existing underground utility and interference.

1. Horizontal location, including the design station or coordinates where the existing utility will cross or interfere with the proposed underground facility.

2. Elevation of the top and bottom of the existing utility. For round utilities, bottom elevation can be estimated provided the outside diameter of the utility is determined. For box-shaped utilities or conduit banks, excavate to the bottom of the utility to determine the bottom elevation.
3. The utility size, material type, and type of existing backfill

D. Determine the following properties for each connection to existing underground utilities or structures:
1. Horizontal location of the proposed connection point.
2. Elevation of the top and bottom at the proposed connection point.
3. Horizontal and vertical angle of existing utility in reference to the proposed underground utility.
4. The utility size, material type, and type of existing backfill

E. Prepare a detailed field investigation report to include the information described above. Organize the report by station.

F. Following excavation and field date gathering, backfill excavations, and within paved areas, restore the surface pavement to match the material and thickness of the pre-investigation pavement unless otherwise required by the jurisdiction having authority over the pavement repairs.

10-2.03 CONTROL OF WATER

10-2.03A GENERAL

10-2.03A(1) Section Includes

A. Control of surface water and excavation drainage.

B. Protection of the work against surface runoff, and exfiltration from existing pipes and structures.

C. Collection, treatment, and disposal of removed water.

10-2.03A(2) Definitions

A. Excavation drainage includes keeping excavations free of surface water, seepage water, and exfiltration from existing pipes and structures.

B. Surface drainage includes use of temporary drainage ditches and dikes and installation of temporary culverts and sump pumps with discharge lines as required to protect the work from any source of surface water.

C. Construction Water: surface or groundwater that is subject to removal by the Contractor as necessary to complete the work.

10-2.03A(3) Permits

A. Obtain and comply with all permits for the control and disposal of surface and groundwater.

B. Pay all associated fees.

C. Obtain coverage under the Central Valley Regional Water Quality Control Board Dewatering and other Low Threat Discharges to Surface Waters General Permit (Order No. R5-2008-0081, NPDES No. CAG 995001), if appropriate, for any dewatering activity, including removal and discharge of groundwater, accumulated rainwater and removal of water from cofferdams or diversions.

D. Comply with the conditions of the General Permit for Dewatering Activities and Caltrans BMP# NS-2 Dewatering Operations.

10-2.03B PRODUCTS

10-2.03B(1) Facilities and Equipment

A. Provide all necessary facilities and equipment for controlling surface water and excavation drainage as necessary to complete the Work.

10-2.03C EXECUTION

10-2.03C(1) Surface and Excavation Drainage Water Control

A. Perform surface and excavation drainage water control in conformance with regulatory requirements as modified herein.

B. Have available at all times during excavation activities,

1. Sufficient pumping equipment and labor necessary to keep excavations clear of water as necessary to complete Work as specified
2. Adequate standby equipment as may be necessary to keep the control of water operation in full effect due to equipment or power failure.

C. Commence control of water at an appropriate time during excavation and continue until facilities and structures are installed and backfilled and are sufficiently protected from the effects of hydrostatic uplift or floatation.

D. Intercept surface and excavation water and divert it away from excavations through use of dikes, ditches, curb walls, pipes, sumps or other approved means. The requirement includes temporary works required to protect adjoining properties from surface drainage caused by construction operations.

E. Excavations extending below groundwater levels or encountering perched groundwater.

1. Where possible, direct inflow to a sump where water can be removed by a pump within narrow trench excavations that penetrate less than a few feet below the groundwater level and do not encounter loose or cohesionless soils.
2. Provide well points, perimeter trench drains, or deep sumps as necessary to control of water within wider, deeper, and/or more extensive excavations.
3. To maintain bottom stability of wider, deeper, or more extensive excavations, draw down groundwater levels a minimum of 5 feet below the lowest portion of the excavation.

F. Control water in such a manner as to preserve the undisturbed bearing capacity of the subgrade soils at proposed bottom of excavation and protect temporary excavation slope stability during construction.

1. If foundation soils are disturbed or loosened by the upward seepage of water or an uncontrolled flow of water, excavate and replace the affected areas with drain rock on geotextile fabric at no additional cost to the Owner.

G. Implement ground settlement monitoring, prior to the commencement of the dewatering operation:

1. Survey all existing structures in the vicinity of the proposed dewatering operation,
2. Monitor the existing structures for settlement, both total and differential, throughout the dewatering operation.
3. Prepare a daily report for each structure and provide to the Engineer identifying the original baseline elevation; the elevation measured each day, and corresponding total and differential settlement.
4. Modifications to the dewatering program may be necessary, as determined by the Engineer, should dewatering induced settlements be detected.

10-2.03C(2) Disposal of Water

A. Construction water may be disposed into existing drainage courses, subject to applicable permitting requirements.

B. Design and control the dewatering operations such that disposal of water does not cause erosion or other damage and such that water to be disposed of is free from silt and other objectionable materials.

C. Use settling basins and/or other means to control groundwater quality prior to discharge as necessary.

D. Follow the applicable construction activity Best Management Practices (BMP) for the project.

E. Refer to "Caltrans Storm Quality Handbooks, Construction Site Best Management Procedures Manual", November 2003 or latest edition.

10-2.03C(3) Termination of Dewatering

A. Terminate of control of water operations in such a manner as to maintain the undisturbed state of the natural foundation soils, prevent disturbance of compacted backfill and prevent flotation or movement of structures, pipelines, and sewers.

B. If damage occurs due to improper termination of dewatering, repair the damage to the satisfaction of the Engineer and at no additional cost to the Owner.

C. Remove all control or water devices following completion of the Work requiring control of water.

10-2.04 EXCAVATION SUPPORT AND PROTECTION

10-2.04A GENERAL

10-2.04A(1) Section Includes

A. Temporary excavation support systems.

B. Comply with all governing regulations pertaining to excavation safety (e.g., the most current edition of Cal/OSHA Construction Safety Orders, Article 6).

10-2.04A(2) Submittals

A. Prepare and submit in accordance with Section 10-1.07.

B. Submit information as a complete package. Include all items required by the Contract Documents. Incomplete submittals will not be reviewed and will be returned for resubmittal as a complete package.

C. Shop Drawings

D. Copy of annual trench/excavation permit issued by the Department of Industrial Relations.

10-2.04A(3) Performance Requirements

A. 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.

B. The safety of workmen, 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.

C. 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 to prevent movement of soil and rock that may cause damage to adjacent shoring systems, structures, and utilities, damage or delay the work, or endanger life and health.

10-2.04A(4) General Design Requirements

A. Design excavation support systems to meet requirements and standards of the Occupational Safety and Health Administration (OSHA).

B. Design excavation support systems to meet the requirements of California Code of Regulations, Title 8 – Construction Safety Orders and California Labor Code Sections 6705 to 6707.

C. Design structural steel members in accordance with the American Institute of Steel Construction (AISC) Manual of Steel Construction Allowable Stress Design and the Uniform Building Code.

D. Excavation support systems for trench excavations shall be selected by the Contractor based on the soil conditions, depths of trench excavations, groundwater conditions and other site conditions. No attempt has been made by Engineer to define acceptable trench shoring options.

E. Excavation Support System shall prevent running, caving, raveling, and sloughing of excavation walls and associated loss of adjacent ground.

F. Shoring and bracing systems shall be designed to assure worker safety and optimal conditions for pipe installation and minimize damage to adjacent pavement utilities.

G. Allowable Deflection: No more than 1/2-inch at any point on the shoring system.

10-2.04A(5) Geotechnical Report

1. See Appendix A for the geotechnical report prepared by Blackburn Consulting for the bore and jack pipe installation on this project.

10-2.04B PRODUCTS (NOT USED)

10-2.04C EXECUTION

10-2.04C(1) Installation and Removal

A. Excavate only as much as can safely stand unsupported prior to installing shoring, but in no case more than 4 feet shall be left unsupported at any time. Install lagging immediately after excavation.

B. All shoring and bracing shall be completely removed. Removal of shoring shall:

1. Be performed in step with backfilling sequence (shoring should not be removed ahead of backfilling).
2. Not cause loosening or shifting of backfill, particularly within the pipe embedment material.
3. Not cause damage to finished pipeline, structures, pavements, or other utilities.

C. Any void space created by shoring should be completely filled with CLSM.

D. Prior to beginning installation of the excavation support system, pothole to locate existing buried utilities in the vicinity of the excavation. Survey utilities and compare actual locations to those locations indicated on the Drawings and the Shop Drawings. Determine any areas of conflict and revise the design and layout of the excavation support system to eliminate these conflicts.

10-2.04C(2) Sloping and Benching of Excavated Faces

A. The use of sloping and benching systems in existing landscaping or paved areas may result in additional landscape and/or pavement restoration requirements that were not envisioned in this contract. Contractor shall notify the County prior to planning or initiating the use of sloping or benching excavation systems.

B. Pavement restoration requirements generated by Contractor's work that encroach on an adjacent paved traffic lane will result in additional grinding and repaving of the entire lane width to conform with County.

10-2.05 TRENCHING

10-2.05A GENERAL

10-2.05A(1) Section Includes

A. Trench excavation and backfilling for pipe and pipeline appurtenances.

B. Minor structure excavation and backfill associated with pipeline construction.

10-2.05A(2) Referenced Sections

A. Section 10-1.03 – Work Sequence and Constraints

B. Section 10-1.07 – Submittals

C. Section 10-1.11 – Traffic Control
D. Section 10-2.01 – Controlled Low Strength Material
E. Section 10-2.02 – Subsurface Investigations
F. Section 10-2.03 – Control of Water
G. Section 10-2.04 – Excavation Support and Protection
H. Section 10-2.08 – Cast-in-Place Concrete
I. Section 10-2.09 – Pavement and Concrete Restoration

10-2.05A(3) Definitions

A. Backfill: Earthwork necessary to provide fill between new structures and excavation up to the sub or finish grade.
B. Bedding Zone: The area from the trench subgrade to the bottom of the pipe.
C. Embedment or Pipe Zone: The area from the top of the Bedding Zone to the bottom of the Trench Zone as indicated on the Drawings.
D. Excavation: Earthwork necessary to remove existing material for the installation of structures.
E. Finish Grade: Final surface following placement of surfacing, if any, as indicated.
F. Native Material: Naturally occurring soils excavated from the trench after top soil, if any, has been removed.
G. Open Areas: Areas along the pipeline route that are outside Roadway Shoulders or in open pasture.
H. Pavement Section: The upper portion of the trench within paved areas comprising the base and finished surface materials.
I. Roadway Shoulders: Paved areas and unpaved areas outside the traveled way and extending to the outside edge of any roadside drainage features.
J. Spoils: Unsuitable or excess excavated materials.
K. Subgrade: The surface of the earthwork on which bedding, base materials, pavement, other surfacing materials, or structure bases are placed.
L. Traveled Way: The portion of the roadway where vehicles travel, does not include shoulders.
M. Trench Backfill: Materials used to backfill the trench including bedding zone, pipe zone, and trench zone backfill.
N. Trench Zone: The area from the top of the Pipe Zone to the bottom of the pavement base (subgrade), ground surface or other surface material over the trench excavation.
O. Wet Trench: Trench with water or groundwater present in the trench.

10-2.05A(4) Submittals

A. Prepare submittals and submit in accordance with Section 10-1.07.
B. Material Data: Submit the following for each material type imported to the site:
    1. Material source.
    2. Gradation.
    3. Moisture-density curves.
    4. Permeability tests (for clay material).
C. All material submittals must be dated to less than 1 year prior to Notice-to-proceed.
D. For excavations 5 feet or deeper, submit detailed plan of all shoring, bracing, side sloping, or other provisions for worker protection against the hazard of caving ground during excavations in accordance with Section 10-2.04.

10-2.05A(5) Quality Assurance

A. Materials and Compaction Testing
   1. Source Testing of Materials: Provided and paid for by the Contractor.
   2. Field Testing of Compaction: Initial testing provided and paid for by the County. Cost of retesting due to failure of Contractor placement shall be paid for by the Contractor.

B. Compaction Testing:
   1. County will provide initial in-place compaction testing of backfill materials.
   2. Contractor shall be responsible for the cost of all re-testing due to failure of initial tests.

10-2.05B PRODUCTS

10-2.05B(1) Materials

A. General:
   1. Obtain trench backfill materials from one or more of the following:
      a. Processed on-site materials,
      b. Imported from off-site borrow areas,
      c. Processing plants.
   2. Provide materials as indicated or as may be necessary to complete the Work at no additional cost to the Owner, unless a unit price item is included for trench backfill materials in the bidding schedule.
   3. Provide materials as indicated in the Schedule in 10-2.05C(9).
   4. Soils unsuitable for use as trench backfill materials:
      a. Soils classified under ASTM D2487 categories Pt, OH, CH, MH, or OL; or soils that contain classifications Pt, OH, CH, MH, or OL in combination with any other soil classification, such as CH/CL.
      b. Soils which cannot be compacted sufficiently to achieve the density specified for the intended use, are highly expansive, or are unstable or "pump", regardless of the degree of compaction.
      c. Soils that contain hazardous or designated waste materials including petroleum hydrocarbons, pesticides, heavy metals, and any material which may be classified as hazardous or toxic according to applicable Regulations.
      d. Soils that contain greater concentrations of chloride or sulfate ions, or have a soil resistivity or pH less than the existing on-site soils.
      e. Topsoil, except as allowed below.
      f. Soils containing rocks, stones, or boulders larger than specified.
      g. Soils that contain more than 5 percent organic matter when tested in accordance with ASTM D2974.

B. Native Materials:
   1. Materials generated from on-site materials conditioned as follows:
      a. Maximum particle size: 1.5 inches.
      b. Percent passing No. 200 sieve: Less than 5 percent.
      c. Sand equivalent: 30 minimum.

C. Crushed Rock:
   1. Clean, hard, sound, durable, uniform in quality, and free of soft, friable, thin, elongated or laminated pieces, and disintegrated material.

2. Have 100 percent of its particles with at least one fractured face on a weight basis, when tested for crushed particles per ASTM D5821.
3. Comply with the grading shown in the following table:

Sieve Size	Percentage Passing		
	1-inch	3/4inch	1/2-inch
1-1/2-inch	100	-	-
1-inch	90-100	100	-
3/4-inch	30-60	90-100	100
1/2-inch	0-20	30-60	90-100
3/8-inch	-	0-20	20-60
No. 4	0-5	0-5	0-15
No. 8	-		0-5

D. Sand:
1. General: Clean, coarse, natural sand free from organic material, suitable for the purpose intended.
2. Gradation: 90 percent to 100 percent will pass a No. 4 sieve and not more than 5 percent will pass a No. 200 sieve.

E. Controlled Low Strength Material (CLSM): In accordance with Section 10-2.01.

F. Aggregate Base: Class 2 aggregated 3/4" base as specified in Caltrans Section 26.

G. Clay:
1. On-site or off-site clay material free of organic materials or rocks.
2. Permeability: Not greater than 1x10-6 cm/sec when tested in accordance with ASTM D2434.

H. Permeable Backfill:
1. General: Hard, durable, clean sand, gravel or crushed stone, free from organic material, clay balls or other deleterious substances.
2. Durability index: Not less than 40
3. Sand equivalent: Not less than 75.
4. Comply with the grading shown in the following table:

Sieve Sizes, Square Openings	Percent by Weight Passing Sieve
1-inch	100
3/4-inch	90 – 100
3/8”	40 – 100
No. 4	25 – 40
No. 8	18 – 33
No. 30	5 – 15
No. 50	0 – 7
No. 200	0 – 3

I. Geotextile Fabric:
1. Geotextile fabric shall be a nonwoven material consisting of polyester, nylon, poly propylene filaments formed into a stable network.
2. The fabric shall be permeable, not act as a wicking agent, be inert to commonly encountered chemicals, be rot-proof, and resistant to ultraviolet light.

3. The geotextile fabric shall also conform to the following physical properties:

Property	Test value	Test method
Weight	5.4 oz/yd2 (min.)	ASTM D3776/D5261
Grab tensile strength	150 lb (min.)	ASTM D4632
Elongation at break	50% (max.)	ASTM D4632
Puncture strength	80 lb (min.)	ASTM D4833
Burst strength	300 psi (min.)	ASTM D3786
Apparent opening size	#70 (max.)	ASTM D4751
Permitivity	1.0 sec-1 (min.)	ASTM D4491
UV resistance	70% (min.)	ASTM D4355

4. The geotextile fabric shall be Mirafi 160N, Linq Industrial Fabrics 150 EX, or equal.

J. Structure Backfill Material:
   1. General: Granular, low to non-expansive soil.
   2. Plasticity index: 12 or less.
   3. Liquid limit: 30 or less.
   4. Comply with the grading shown in the following table:

Sieve Size	Percentage Passing
6-inch	100
3-inch	95-100
No. 200	15-50

K. Cement Slurry Backfill:
   1. Slurry cement backfill: Provide a fluid workable mixture of aggregate, cement, and water.
   2. Cement: In accordance with Section 10-2.08, except testing is not required.
   3. Water: Free from oil, salts, and other impurities that adversely affect the backfill.
   4. Aggregates: Select one of the following:
      a. Commercial-quality concrete sand
      b. Excavated or imported material in any combination, free of organic material and other deleterious substances and complying with the grading requirements shown in the following table:

Sieve size	Percentage passing
1-1/2"	100
1"	80–100
3/4"	60–100
3/8"	50–100
No. 4	40–80
No. 100	10–40

   5. Proportion slurry cement backfill by weight or volume. Use at least 188 pounds of cement per cubic yard. Use sufficient water to produce a fluid workable mix that flows and can be pumped without segregation during placement.
   6. Mix materials thoroughly by machine. Use a pugmill, rotary drum, or other authorized mixer. Mix until cement and water are thoroughly dispersed.

L. Concrete: In accordance with Section 10-2.08.

10-2.05C EXECUTION

10-2.05C(1) Existing Utility Locations

A. Perform subsurface investigations to locate existing underground utilities in accordance with Section 10-2.02.

10-2.05C(2) Removal and Replacement of Pavement

A. In paved areas, remove and replace pavement as follows unless otherwise indicated:
   1. Saw cut existing pavement along each side of the trench.
   2. Remove and dispose of the pavement lying within the limits of the saw cuts and from adjoining areas damaged by the cutting, removal, excavation and backfilling operations.
   3. During subsequent trench excavation and backfill activities, minimize disturbance of the adjoining pavement.
   4. Restore pavement surfaces in accordance with Section 10-2.09.
   5. Refer to drawings and Section 10-1.03 for additional pavement removal and replacement requirements.

10-2.05C(3) Trench Excavation

A. General Requirements
   1. Stabilize and support all faces of the trench excavation as specified in Section 10-2.04.
   2. Control groundwater as specified in Section 10-2.03.
   3. Carefully remove and stockpile two feet of topsoil in landscaped areas.

B. Open Trenches
   1. Open Trench Limitations: Unless otherwise indicated or required by the Agency having jurisdiction limit open trenches as follows:
      a. Do not open more than 200 lineal feet of excavated trench at any one time during the Work shift.
      b. Up to 25 feet of trench, measured at the surface, may remain open during any non-work shift, provided:
         1) The entire trench opening is plated with steel plates, secured to avoid movement, and the edges backfilled with temporary pavement to provide a smooth transition.
         2) Shoring is installed to prevent collapse of the trench excavation.
   2. Open Trench Safety Requirements:
      a. Provide traffic control in accordance with Section 10-1.11.
      b. Erect traffic barricades and warning lights meeting safety requirements of the County where open trench is within 12 feet of any travelled way.
      c. Erect signs to warn oncoming vehicles of rough road or steel plates in road, as appropriate.
      d. Provide fencing or warning tape to protect the public from open trench in open areas.

C. Trench Excavations
   1. Excavate trenches and maintain excavation such that pipe and pipeline accessories are installed in an open trench.
   2. Excavate to subgrade elevation and to trench width dimensions indicated on the Drawings.
   3. Excavate all materials of whatever nature encountered, including all obstructions of any nature that would interfere with the proper execution of the trenching Work unless otherwise indicated.

4. Where pipelines are to be installed in embankments, fills, or structure backfills, construct fill to a level at least one foot above the top of the pipe before the trench is excavated.
5. Trench shield:
    a. If a moveable trench shield is used during excavation operations widen the trench width so that the shield is free to be lifted and then moved longitudinally without binding against the trench sidewalls.
    b. If the trench walls cave in or slough, the trench shall be excavated as an open cut excavation with sloped sidewalls or with trench shoring, as indicated and as required by the pipe structural design.

D. Trench Bottom: Excavate and shape trench bottoms to provide uniform subgrade for placement of Bedding Material.
1. Unsuitable Hard Trench Bottom: If bottom of excavation is found to consist of rock or any material that cannot be excavated to provide uniform bearing surface:
    a. Notify Engineer of the conditions encountered and obtain concurrence that an unsuitable trench bottom condition is present.
    b. Remove such rock or other material to a depth of not less than 6 inches below the original design elevation of the bottom of the trench.
    c. Place bedding material or aggregate base course material to restore the trench bottom to the original design elevation. Place in lifts not exceeding 8 inches in un-compacted thickness and compact to 90 percent of maximum density.
2. Unsuitable Wet or Soft Trench Bottom: If bottom of excavation is found to consist of soft or unstable material which is incapable of properly supporting pipe:
    a. Notify Engineer of the condition encountered and obtain concurrence that an unsuitable trench bottom condition is present.
    b. Remove such material to a depth and for the length required, as determined by the Engineer.
    c. Place bedding material or aggregate base course material to restore the trench bottom to the original design elevation. Place in lifts not exceeding 8 inches in un-compacted thickness and compact to 90 percent of maximum density.
3. Over-excavation
    a. Over-excavation to a depth 6 inches or less below the design trench bottom shall be done at no additional cost to the Owner.
    b. When the over-excavation ordered by Engineer is greater than 6 inches below the limits shown, additional payment will be made to Contractor. Additional payment will be made under separate unit price bid items for over-excavation if such bid items have been established. Otherwise, payment will be made in accordance with a negotiated price.
    c. Measurement and Payment:
        1) Measurement of quantities for payment of over-excavation will be by calculation by Engineer of the volume of materials removed as additional excavation, including additional material that must be excavated from slopes. Such calculation shall be based on the difference between dimensions before and after the additional excavation work. No compensation will be made for removal of materials beyond the limits of the additional excavation ordered by Engineer or for materials which may come into the excavation from outside the designated limits. No compensation will be made for removal of materials that are outside of the minimum horizontal dimensions indicated, even if Contractor has excavated wider than the minimum indicated.

2) Payment for over-excavation will be made by the cubic yard. The payment shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in excavating and backfilling the over-excavation completely, to a level at the bottom of the pipe bedding indicated. Payment shall also include full compensation for the removal and disposal of the excavated materials, import and installation of the backfill materials, control of water in the excavation, excavation support, and all costs associated with the interruption of construction operations during the review of the foundations, excavation, backfill, and all other operations required for, or as a result of, over-excavation.

4. Over-excavation not ordered by the Engineer:
   a. Any over-excavation carried below the grade ordered or indicated, shall be backfilled to the required grade with the indicated material and compaction. Such work shall be performed by Contractor at no additional cost to Owner.

10-2.05C(4) Excavation in Vicinity of Trees

A. Except where trees are indicated to be removed, protect trees from injury during construction. No trees are to be removed with this project.

B. Do not cut tree roots over 2 inches in diameter without permission of the Engineer. Where such cuts are required, an approved certified arborist shall determine any work requirements needed to preserve the health of the tree. Contractor contract with the arborist and shall have said work performed by a qualified contractor at no additional cost to the County.

C. Support trees during excavation by means approved by a certified arborist.

10-2.05C(5) Placement of Bedding and Backfill

A. Place Bedding Material in a single lift, and at uniform density, with minimum possible compaction. Grade material to allow installation of the pipe at the design elevations.

B. Depressions for Assembly of Joints
   1. Dig holes for bell or coupling assembly after Bedding Material has been placed at the trench bottom and fine graded to the design elevation.
   2. Create sufficient width and depth to provide ample room for tightening bolts, welding, or other joint assembly activities.
   3. Excavate holes only as necessary in making joints. Ensure that pipe rests upon prepared trench bottom and is not supported by any portion of the joint.

C. Place pipe zone, trench zone, and final backfill in lifts not exceeding 8 inches as shown on the Drawings.

D. Do not dump backfill materials directly on the pipe.

E. Consolidation:
   1. Do not use water-settling methods to consolidate trench backfill materials.
   2. Use mechanical means, shovel slicing or vibratory compaction, to compact granular backfill materials under pipe haunches.

F. Backfill voids that may form when removing shoring and bracing.

G. Backfill with stockpiled topsoil in all areas where the original topsoil was stockpiled at start of construction activities.

H. Restore all drainage swales and water courses to their original alignments and grades.

I. Install and maintain for a period of at least one year following completion of construction in any area, the facilities and management practices required by the Project Storm Water Pollution Prevention Plan, if any.

J. Install and maintain for a period of at least one year following completion of construction in any area, the measures required by the environmental permitting Drawings, permits, and approval documents of the agencies that have issued permits for construction of the Project.

10-2.05C(6) Compaction Requirements

A. Compaction requirements specified herein are in-place densities of compacted backfill.

B. Initial Trench Backfill Compaction Demonstration

1. Demonstrate adequacy of compaction equipment and procedures before exceeding 300 lineal feet of trenching work.
2. Continued Compaction Requirements: When specified degree of compaction is achieved, proceed with trenching and backfilling activities using the established equipment and procedures.

10-2.05C(7) Disposal of Spoils

A. Dispose of spoils and unsuitable materials in a lawful manner at an off-site location.

B. Do not dispose of spoils within temporary or permanent easements.

C. A spoils disposal area has not been identified for this project. It is Contractor's responsibility to identify spoils disposal areas and to negotiate all agreements necessary and pay all costs to dispose of spoils.

D. Obtain written permission and landowner agreements that allows the disposal of spoils and contains language that states that Owner, Engineer, and Design Consultant shall not be liable for any claims or damages resulting from Contractor's use of properties for disposal of spoils.

E. Prior to removal of any materials from the project site, provide copies of permits, landowner agreements, and approvals to Engineer.

10-2.05C(8) Field Quality Control

A. Cost of compliance testing: Initial testing by the County. Retests due to failure of Contractor shall be at Contractor's cost.

10-2.05C(9) Schedule

A. Construct pipeline using materials specified in the following schedule. Where options are provided, Contractor may select materials from the materials listed.

1. Bedding Zone:
   a. Sand
   b. Class 2 Aggregate Base
2. Wet Trench:
   a. Crushed Rock (3/4") wrapped with filter fabric
3. Embedment Zone:
   a. Crushed Rock (3/4/")
   b. Plant-mixed 2-Sack Cement-Sand Slurry
4. Trench Zone:
   a. Native Backfill within unpaved areas.
   b. Class 2 Aggregate Base

10-2.06 POTABLE WATER SYSTEM

10-2.06A GENERAL

10-2.06A(1) Section Includes

A. Labor, equipment, materials, and incidentals necessary to install the new potable water distribution system complete and in place.

10-2.06A(2) References

1. All materials and installation shall conform to the Contract Plans and Specifications and the most recent edition of the City of Davis Public Works Department Standard Specifications.

10-2.06A(3) Submittals

A. Prepare submittals and submit in accordance with Section 10-1.07.

B. Staging and execution plan for connection, filling, disinfection, testing, flushing and activation of new pipe system

C. Material Data: Submit the following for each material type imported to the site:

1. Manufacturer's product information ("cut") sheet with make and model of each product.

10-2.06B PRODUCTS

10-2.06B(1) Standard Materials

A. Materials shall be as specified in Section 203 of the City Specifications, except as modified herein.

B. Where multiple manufacturers or models of the various materials are allowed by the City Standards, Contractor shall provide only one of the allowed make/model for each material type throughout the work under this contract.

10-2.06B(2) Pipe (6-Inch and Larger)

A. Polyvinyl Chloride (PVC) Pipe and Joints

1. AWWA C900 DR18, in accordance with Section 203-4.1 of the City Standards.

B. Ductile Iron Pipe and Joints (only where shown specifically on the Drawings)

1. AWWA C150 and 151, Pressure Class 250, in accordance with Section 203-4.2 of the City Standards.

10-2.06B(3) Pipe Fittings (6-Inch and Larger)

A. Ductile Iron

1. Fusion bonded epoxy coated, double cement lined, in accordance with Section 203-4.3 of the City Standards.

10-2.06B(4) Locating Wire

1. Per Section 203-4.5 of the City Standards

10-2.06B(5) Marking Tape

1. Per Section 203-4.6 of the City Standards
2. Marking shall say "Potable Water Main Buried Below"

10-2.06B(6) Gate Valves

A. Resilient seat, Per Section 203-5 of the City Standards.

B. Approved gate valve manufacturers are American Flow Control (AFC) and Mueller.

10-2.06B(7) Butterfly Valves

A. Per Section 203-5 of the City Standards

10-2.06B(8) Valve Boxes

A. Per Section 203-7 of the City Standards

B. Valve box lids shall be marked with "DAVIS WATER".

10-2.06B(9) Water Services, from Main to Meter Valve

A. Per Section 203-8 of the City Standards

B. Services match existing service size or as noted on the Contract Plans.

C. Contractor to supply and install Badger E-Series Ultrasonic meters per City Standard

D. Contractor to supply and install automated meter reading units with each meter per City Standard

10-2.06B(10) Fire Hydrants

A. Wet barrel fire hydrants conforming to AWWA C503 and Section 203-6 of the City Standards

10-2.06B(11) Backflow Preventor

A. Per Section 203-8.4 of the City Standards

B. Backflow preventor assemblies shall be installed with insulated protective covers.

10-2.06B(12) Blow off Valves

A. Per Section 203-9 of the City Standards

10-2.06B(13) Water Sampling Station

A. Per City Standard Plan 101-10 and all applicable City Standards.

10-2.06B(14) Combination Air Valves

A. Per Contract Plans and these specifications.

B. Air release and vacuum relief valves shall be single body, combination air release valves conforming to AWWA C512. The valve body shall be designed for a water working pressure of not less than 200 psi and shall have fusion-bonded epoxy coating on the interior and exterior surfaces of the body, stainless steel floats, and all working parts shall be brass, bronze, stainless steel, or other non-corroding materials.

C. Contractor shall perform additional maintenance and servicing of installed Combination Air Valves in conformance with Section 10-2.06C(6) of these specifications.

D. Submittals shall designate all options required for submitted make and model of combination air valve to meet these specifications. Submittal shall include an operation and maintenance manual for the air valve. Submittals subject to approval of City.

10-2.06B(15) Abandon Existing Water Main

A. Caps or plugs to be used for sealing the end of existing water pipes to be abandoned in-place shall be water-tight caps or plugs pre-manufactured for the type of pipe being capped or plugged.

10-2.06C EXECUTION

10-2.06C(1) Pipeline and Water Service Installation

A. Pipeline shall be installed in conformance with City Standard Specification Section 304 and 305 including trenching, bedding, and initial backfill.

B. Final backfill shall be installed in conformance with County Standard Specifications.

C. Water service piping may be installed by trenchless methods to reduce cuts in existing pavement.

D. The existing water system contains non-potable water due to constituents in the well water.

10-2.06C(2) Disinfection and Flushing

A. CAUTION! Existing County well water system for the North Davis Meadows County Service Area currently contains non-potable water containing levels of nitrates, hexavalent chromium and other constituents that are in excess of State mandatory Maximum Contaminant Levels. All water from the existing well system shall be systematically flushed from the resulting completed water system (mains and service pipes through meters).

B. New piping of 10-inch diameter and larger shall only be filled with water from the City water system. Where smaller mains less than 10-inch in diameter and services are constructed to replace smaller mains, piping may be temporarily filled with well water for testing purposes, but must be systematically flushed as noted in Paragraph A above.

C. New pipeline shall be disinfected and flushed in accordance with City Standard Specification 305-12

D. If analytical results indicate new facility does not meet bacteria limits, repeat disinfection procedures and analytical testing of new samples until regulated water quality limits are satisfied.

10-2.06C(3) Pressure Test and Leak Test

A. Pipeline shall be hydrostatically tested in accordance with City Standard Specification 305-13

B. In-place pipe replacement segments and connections to existing system which are subject to continuous inspection shall be checked for leakage after activation, but are not subject to separate pressure testing.

10-2.06C(4) Connection to Existing City System

A. Connections shall be made in accordance with City Standard Specification 305-14

B. All fittings for connections shall be brushed clean and swabbed with a strong HTH solution.

C. Connections to and disconnections from existing water systems shall be staged as noted on the Plans to provide for continuity of domestic and fire protection services, while protecting the existing City system and existing connected uses from contamination.

D. Contractor shall prepare and submit a plan to the City for connecting, filling, testing and activation of the project pipe systems, which addresses the staging and execution of connection, filling, disinfection, testing, flushing, disposal of testing water and activation of all new pipe segments in project.

E. Customer service outages for water main work shall be limited to a single 4-hour period, except in-place water main replacement segments may extend the outage up to 6-hours, if the Contractor is working continuously to keep duration as short as possible.

10-2.06C(5) Connection to Existing Private Domestic System

A. Connections to the existing domestic system shall be coordinated with the homeowner for shutdown.

B. Shutdowns shall be limited to a single 4 hour period for plumbing diagnostics and investigation and a single 4 hour period for connection.

10-2.06C(6) Operation and Maintenance of Combined Air Valves After Installation and Activation

A. Contractor shall perform additional maintenance and operation of installed Combination Air Valves at six (6) months and at eleven (11) months after acceptance of completed project. Operation and maintenance shall be performed under the observation of City staff. Contractor shall notify the City a minimum of two weeks prior to the scheduling of the air valve operation and maintenance.

10-2.06C(7) Abandon Existing Water Pipe In-Place

A. Contractor shall cut and remove the existing pipe to a distance of not less than two feet (2') clear from the pipe and fittings to remain in service.

B. Contractor shall drain all water from ends of pipe being cut and abandoned prior to capping or plugging.

C. Contractor shall install water-tight cap or plug on end of abandoned pipe.

D. Contractor shall mark and survey the location of the remaining abandoned pipe and document the location of each abandoned end in the as-built record drawings.

10-2.07 BORING AND JACKING OF STEEL PIPE CASINGS FOR INSTALLATION OF CARRIER PIPES.

10-2.07A INSTALLATION OF CARRIER PIPE WITHIN THE CASING.

10-2.07A(1) System Description

A. Installation of steel pipe casings by boring and jacking without excavating the overlying surface. The casing pipe is pushed into place by hydraulically jacking sections of pipe after creating a void by drilling with an auger to remove soil.

B. Following installation of the pipe casing, the carrier pipe is inserted within the casing and the annular space between the carrier pipe and the casing is filled as indicated and sealed at the ends.

10-2.07A(2) Referenced Sections

A. Section 1.07 – Submittals

B. Appendix A - Geotechnical Report – by Blackburn Consulting, Inc.

10-2.07A(3) Submittals

A. Comply with Section 1.07.

B. Shop Drawings

1. Site Layouts: Detailed layout of bore pit location and dimensions, receiving pit location and dimensions, material storage areas, equipment set-up areas, vehicle staging areas, spoils off-haul area and other areas needed to complete the Work.
2. Information on boring equipment, piping/casing appurtenance, augers, and equipment to move spoils from the bore pit.
3. Bore pit/receiving pit shoring, bracing and construction details.
4. Thrust wall details.

C. Product Data:

1. Diameter, thickness and class of steel casing.
2. Casing spacers and end seals for carrier pipe.

D. Calculations:

1. Calculation verifying pipe and thrust wall will accommodate thrust forces.
2. Maximum allowable exterior grout pressure.
3. Geotechnical data provided in the geotechnical report prepared by Blackburn Consulting in Appendix A of these Contract Specifications.

E. Experience Qualifications: Verify 5 years of experience in boring and jacking pipe casings by providing references for the 3 most recent bore and jack projects completed. Include a description of the project, contact name and telephone number.

10-2.07A(4) Quality Assurance

A. Experience: Utilize a contractor with a minimum of 5 years' experience in bore and jack methods.

B. Welding: Utilize qualified welders who have qualified under the provisions of AWS D1.1.

10-2.07A(5) Definitions

A. Casing: The pipe jacked into place to contain the carrier pipe.

B. Carrier Pipe: The pipe for operational use that is installed inside the casing and used to carry flows.

C. Jacking Frame: Machinery that advances the auger and the casing and the carrier pipe from the drive/sending pit to the receiving pit.

D. Drive/Sending Pit: The excavation constructed to locate the Jacking Frame in the proper location to install the casing.

E. Receiving Pit: The excavation constructed at the opposite side of the trenchless crossing from the Drive/Sending Pit to receive the equipment following completion of the augering operation.

10-2.07A(6) Notifications

A. Notify the Engineer 7 days in advance of mobilization into trenchless crossing site.

B. Advise Engineer of the scheduled start of work at least 7 days prior to beginning work. Comply with all notification requirements specified in construction access permits.

10-2.07B PRODUCTS

10-2.07B(1) Casing Pipe

A. Grout Connections: Mount couplings on the interior of the casing pipe in locations indicated on the Drawings to allow pressure-grouting voids around exterior of pipe casing.

B. Wall Thickness:

1. As indicated on the Drawings.
2. Increase wall thickness as required to accommodate the maximum jacking load, earth load and live load imposed on the casing during installation.
3. Contractor is fully responsible for the sufficiency of the casing wall thickness.

10-2.07B(2) Casing End Seals

A. Casing End Seals: 1/8-inch thick neoprene rubber fastened to the casing and carrier pipes with Type 316 stainless steel band straps to provide a tight seal while allowing pipe movement.

B. Manufacturers:

1. Calpico Model C or W
2. Link Seal End Seal as manufactured by Pipeline Seal and Insulator, Inc.
3. Model AC or AW End Seal as manufactured by Advance Products & Systems, Inc.
4. Or approved equal.

10-2.07B(3) Carrier Pipe Spacers

A. Provide casing spacers/isolators to both support the carrier pipe within the casing and electrically isolate the carrier pipe from the casing.

B. Install carrier pipe spacers at an interval not to exceed seven (7) feet on center unless otherwise indicated on the Drawings.

C. Spacer Design: Consist of a band with a flexible liner and stainless steel risers that support the carrier pipe and fiberglass reinforced runners.

1. Bands: Two-segment, 14 gauge, Type 304 stainless steel.

2. Risers: 10 gauge Type 304 stainless steel.
3. Liner: PVC or EPDM.
4. Runners: 8-inch long by 2-inch wide molded glass reinforced polymer. Attach to the band and risers with stainless steel fasteners, which are set below the wearing surface of the runner.

D. Manufacturers:
1. Calpico M Series
2. Pipeline Seal and Insulator, Inc.
3. Advanced Products & Systems, Inc.
4. Or approved equal.

10-2.07B(4) Grout

A. Cement: ASTM C150, Type I or Type II.

B. Sand: ASTM C404, Size No. 1.

C. Voids outside the casing:
1. Mixture of neat cement or cement and sand suitable to inject through the casing and fill the voids outside the casing.
2. Minimum compressive strength: 100 psi, attained within 24 hours or the maximum allowable grout pressure for the casing, whichever is less.
3. Grout Connections: Threaded couplings regularly spaced on interior of casing at intervals as indicated on the Drawings.

10-2.07C EXECUTION

10-2.07C(1) GENERAL

A. Do not begin casing installation until the following conditions have been met:
1. Required submittals have been made and the Construction Manager has reviewed and accepted all submittals.
2. Preconstruction surveys have been completed.
3. Existing utilities adjacent to and within the vicinity of the sending and receiving pits have been located.
4. Pit excavation and support designs have been completed in accordance with the specifications and applicable safety rules.
5. The preconstruction safety conference has been conducted in accordance with CAL/OSHA requirements. Arrange this conference and inform the Construction Manager of the time and place of the conference at least 7 days in advance.
6. The code of safe practices and an emergency plan in accordance with CAL/OSHA requirements have been prepared by the Site safety representative. Provide the Construction Manager with a copy of each prior to starting tunnel excavation. Hold safety meetings and provide safety instruction for new employees as required by CAL/OSHA.

B. Conform to the requirements of CAL/OSHA.

C. Furnish all necessary equipment, power, water, and utilities for excavation, removal and disposal of spoils, and other associated work consistent with the Contractor's methods of construction.

D. Conduct all operations such that trucks and other vehicles do not create a dust nuisance in the streets and adjacent properties.

E. Promptly remove and dispose of any muck spillage.

F. Conduct all work so as not to disturb roadways, adjacent structures, landscaped areas, or utilities. Any damage shall be immediately repaired to the satisfaction of the County, at no additional cost to the Owner.

G. Surface monitoring: Perform settlement monitoring.

10-2.07C(2) Examination

A. Verify site conditions and report variations from information provided on the Drawings to the Engineer.

10-2.07C(3) Sending and Receiving Pits

A. Locate sending and receiving pits as shown on the Drawings.

B. Size jacking pit to provide adequate space for equipment, operating personnel, access, spoils retrieval and to permit the insertion of the lengths of casing pipe. Pit sizes indicated on the Drawings are the maximum size anticipated to complete the work. If larger pit sizes are necessary, provide proposed pit size as part of the shop drawing. No additional compensation will be provided for pit sizes that are required to be larger than indicated on the Drawings.

C. Install shoring systems in accordance with the approved submittals.

D. Anchor timbers or structural steel members to ensure action of the jacks in line with the axis of the casing.

E. Use a timber or structural steel bearing block between the jacks and the end of the casing to provide uniform end bearing over the perimeter of the casing and to evenly distribute the jacking pressure.

10-2.07C(4) Jacking and Boring of Casing Pipe

A. The auger and cutting head arrangement shall be removable from within the pipe in the event an obstruction is encountered.

B. Remove excavated material from the casing as excavation progresses. Do not accumulate material within the casing or within the bore pit.

C. Control the application of jacking pressure and excavation of soil ahead of the casing to minimize deviation from the required line and grade. No sags over the entire length of casing.

D. Securely anchor leading edges of casings with steel jacking heads to prevent wobble or alignment variation during jacking operations.

E. Casing welding:

1. Conform to the American Welding Society (AWS) standard specifications by qualified welders.
2. Field welds:
    a. Complete penetration (butt welded), single-bevel groove type joints in accordance with the requirements of ANSI/AWWA C206.
    b. Airtight and continuous over the entire circumference of the pipe
    c. Do not increase the outside pipe diameter by more than 3/4-inch.
    d. Do not allow intrusion of the weld metal into the inside of the casing.
    e. Provide stress transfer across the joints capable of resisting the jacking forces involved.

10-2.07C(5) Grouting Casing Exterior

A. Inject grout around exterior of casing to completely fill voids resulting from the boring and jacking operation. Inject grout beginning at the spring line grout connection and continue pumping grout until it appears at the adjacent grout connection. Cap off the connection and move to the adjacent connection and repeat the process.

B. Control grout pressure to avoid deformation of the steel casing and movement of the surrounding soil.

10-2.07C(6) Installation of Carrier Pipe

A. Thoroughly clean casing prior to installing carrier pipe.

B. Carrier pipe spacers:

1. Install spacers in accordance with pipe manufacturer's instructions and as indicated on the Drawings.
2. Install spacers so that centerline of the carrier pipe is located at centerline of the casing pipe.

C. Push carrier pipe through casing pipe and make each carrier pipe joint as indicated in the pipe specification as the carrier pipe is being inserted.

10-2.07C(7) Annular Space Fill

A. Fill the void between casing pipe and carrier pipe completely with sand.

B. Complete hydrostatic testing of carrier pipe prior to backfilling annular space. Carrier pipe with double welded lap joints may be backfilled without pressure test.

C. Seal ends of casing with casing end seals.

10-2.07C(8) Closing of Pits

A. Remove thrust wall upon completion of jacking and boring operations.

B. After equipment and excavated materials have been removed from the drive and receiving pits, prepare the bottom of the pits as a pipe foundation. Backfill excavations, compact backfill materials, and restore the drive and receiving pit sites.

10-2.08 CAST-IN-PLACE CONCRETE

10-2.08A GENERAL

10-2.08A(1) Section Includes

A. Requirements for cast-in-place concrete work.

10-2.08A(2) Referenced Sections

A. Section 1.07 – Submittals

10-2.08A(3) Submittals

A. Comply with Section 1.07.

B. Shop Drawings

1. Reinforcing Steel: Prepare shop fabrication and field installation drawings in accordance with CRSI Manual of Standard Practice and ACI SP.
2. Layout drawings for construction joints.

C. Product Data: Waterstops, curing compound data.

D. Concrete Mix Design: Data on the concrete mix, including aggregate gradations and admixtures, in accordance with ASTM C94.

E. Quality Control Submittals

1. Manufacturer's application instructions for curing compound.
2. Ready-mix delivery tickets for each truck in accordance with ASTM C94.

10-2.08A(4) Quality Assurance

A. Supplier Qualifications: A minimum of 5 years' experience manufacturing ready-mixed concrete and that complies with ASTM C94 for production facilities and equipment.

B. Source Limitations: Use the same brand of cement from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.

C. Concrete and Reinforcement: Unless otherwise specified, meet the requirements of ACI 301 and 318.

D. Hot Weather Concreting: Conform to ACI 305R.

10-2.08B PRODUCTS

10-2.08B(1) Formwork

A. Exposed Areas: Use hard plastic finished plywood.

B. Unexposed Areas: Use new ship lap or plywood.

C. Earth cuts may be used for forming footings.

10-2.08B(2) Concrete

A. Ready-mixed meeting ASTM C94, Option A.

B. Portland Cement: ASTM C150, Type II.

C. Aggregates: Furnish from one source.

1. Natural Aggregates
   a. Free from deleterious coatings and substances in accordance with ASTM C33, except as modified herein.
   b. Free of materials and aggregate types causing pop outs, discoloration, staining, or other defects on surface of concrete.
2. Non-Potentially Reactive: In accordance with ASTM C33, Appendix XI, paragraph X1.1.
3. Aggregate Soundness: Test for fine and coarse aggregates in accordance with ASTM C33 and ASTM C88 using sodium sulfate solution.
4. Fine Aggregates
   a. Clean, sharp, natural sand.
   b. ASTM C33.
   c. Materials Passing 200 Sieve: 4 percent maximum.
   d. Limit deleterious substances in accordance with ASTM C33, Table 1 with material finer than 200 sieve limited to 3 percent, coal and lignite limited to 0.5 percent.
5. Coarse Aggregate
   a. Natural gravels, combination of gravels and crushed gravels, crushed stone, or combination of these materials containing no more than 15 percent flat or elongated particles (long dimension more than five times the short dimension).
   b. Materials Passing 200 Sieve: 0.5 percent maximum.

D. Admixtures: Do not use admixtures that contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Air-Entraining: ASTM C260.
2. Water-Reducing: ASTM C494, Type A or D.
3. Superplasticizers: ASTM C494, Type F or G.
4. Fly Ash: ASTM C618, Class C or F.
5. Color Pigments: Inert mineral or metal oxide pigments, natural or synthetic; resistant to lime and other alkalies.

E. Concrete Mix Design

1. Minimum Compressive Field Strength: 4,000 psi at 28 days when cured and tested in accordance with ASTM C31 and C39.

2. Coarse Aggregate Size: 1-1/2 inches and smaller.
3. Slump Range: 3 to 5 inches.
4. Air Entrainment: Between 3 and 6 percent by volume.
5. Water Reducers: Use in concrete without plasticizers.

F. Proportions
1. Design mix to meet aesthetic and structural concrete requirements.
2. Water-cement ratio (water-cement plus fly ash ratio) shall control amount of total water added to concrete as follows:

Coarse Aggregate Size	W/C Ratio
1-1/2 inch	0.50
1 inch	0.45

3. Minimum Cement Content (Combined Cement Plus Fly Ash Content):
   a. 517 pounds per cubic yard for concrete with 1½ inch maximum size aggregate.
   b. 540 pounds per cubic yard for 1 inch maximum size aggregate.
4. Increase cement content (combined cement plus fly ash content), as required meeting strength requirements and water-cement ratio.
5. Fly Ash Content: minimum 20 percent, maximum 50 percent by weight of total cement content.

G. Mixing: Minimum 70 and maximum 270 revolutions of mixing drum. Non-agitating equipment is not allowed.

10-2.08B(3) Reinforcing Steel

A. Deformed Bars: ASTM A615, Grade 60.
B. Welded Wire Reinforcement: ASTM A185, fabricated from as-drawn steel wire into flat sheets.
C. Bar Supports:
1. For Slab Rebar: Concrete blocks or plastic bar supports.
2. For Rebar in Walls, Beams, Columns, and Slabs Exposed to View: Galvanized steel chairs with plastic tips or plastic bar supports and side form spacers.

10-2.08C EXECUTION

10-2.08C(1) Formwork

A. Design, construct, erect, brace and maintain formwork in accordance with ACI 301.
B. Form Ties
1. Fixed conical or spherical type inserts that remain in contact with forming material and allow for dry packing of form tie holes.
2. Space ties to withstand pressures and to limit deflection of forms to acceptable limits.
3. Wire ties are not acceptable.

C. Construction
1. In accordance with ACI 347.
2. Make joints tight to prevent escape of mortar and to avoid formation of fins.
3. Brace as required to prevent distortion during concrete placement.
4. On exposed surfaces locate form ties in uniform pattern or as shown.

5. Construct so ties remain embedded in the wall with no metal within 1-inch of concrete surface when forms, inserts, and tie ends are removed.

D. Form Removal
   1. Remove after concrete has attained 28-day strength, or approval is obtained in writing from Engineer.
   2. Remove forms with care to prevent scarring and damaging the surface.

10-2.08C(2) Placing Reinforcing Steel

A. Place reinforcing steel in accordance with CRSI Recommended Practice for Placing Reinforcing Bars.

B. Field bending or welding of reinforcing bars will not be allowed.

C. Bar Supports: Provide in sufficient quantity to prevent sagging and to support bars during concrete placement.

D. Splices and Laps
   1. Top Bars: Horizontal bars placed such that 12 inches of fresh concrete is cast below in single placement.
   2. Horizontal wall bars are considered top bars.
   3. Bar lap splices shall conform to General Structural Notes on the Drawings.
   4. Tie splices with 18-gauge annealed wire as specified in CRSI Standard.

10-2.08C(3) Placing Concrete

A. Place concrete in accordance with ACI 301.

B. Before placing concrete:
   1. Check reinforcing steel for proper placement and correct discrepancies.
   2. Remove excessive rust, mill scale, dirt, oil and other material from rebar that may adversely affect bonding to concrete.
   3. Remove water from excavation and debris and foreign material from forms.

C. Before depositing new concrete on existing concrete, clean surface using sandblast or other mechanical means to obtain a 1/4-inch rough profile, and apply epoxy bonding agent in accordance with the manufacturer's instructions.

D. Place concrete as soon as possible after leaving mixer, without segregation or loss of ingredients, without splashing forms or steel above, and in layers not over 2 feet deep. Place within 1-1/2 hours after adding cement to mix.

E. Placement Limitations: 8 feet maximum vertical drop to final placement, when not guided with chutes or other devices to prevent segregation due to impact with reinforcing.

F. Hot Weather
   1. Prepare ingredients, mix, place, cure, and protect in accordance with ACI 305R.
   2. Maintain concrete temperature below 80 degrees F at time of placement, or furnish test data or provide other proof that admixtures and mix ingredients do not produce flash set plastic shrinkage, or cracking due to heat of hydration. Ingredients may be cooled before mixing to maintain fresh concrete temperatures at 80 degrees F or less.
   3. Make provisions for windbreaks, shading, fog spraying, sprinkling, ice, or wet cover, or other means to provide concrete with temperature specified.
   4. Maximum allowable temperature differential between reinforcing steel and concrete: Not greater than 20 degrees F at the time of concrete placement.

10-2.08C(4) Compaction

A. Vibrate concrete as follows:
   1. Apply approved vibrator at points spaced not farther apart than vibrator's effective radius.
   2. Apply close enough to forms to vibrate surface effectively but not damage form surfaces.
   3. Vibrate until concrete becomes uniformly plastic.
   4. Vibrator must penetrate fresh placed concrete and into previous layer of fresh concrete below.

10-2.08C(5) Construction Joints

A. Locate as shown or as approved.
B. Maximum Spacing Between Construction Joints: 40 feet, unless otherwise indicated.

10-2.08C(6) Crack Control Joints

A. Provide crack control joints in concrete slabs on grade, curbs, gutters, sidewalks and other concrete flatwork as follows:
   1. Install crack control joints by use of grooving tool on fresh concrete or saw-cut by use of a saw designed for crack control joints as soon as the concrete hardens sufficiently to support the saw, however, no longer than 12 hours after concrete placement.
   2. Depth: 1/4 the thickness of the slab.
   3. Frequency: Unless otherwise indicated,
      a. At least 2 times the slab thickness in feet (6-inch slab = 12 foot on center).
      b. Rectangular slabs: Maximum spacing 1-1/2 to 1

10-2.08C(7) Finishing

A. Replacement concrete shall match the existing slope, color, texture, and surface finish.
B. Where no special matching existing is not relevant, concrete surfaces shall receive a steel trowel surface, then a light hairbroom finish to produce a profile that is parallel to the slab drainage.

10-2.08C(8) Protection and Curing

A. Protect fresh concrete from direct rays of sunlight, drying winds, and wash by rain.
B. Keep concrete slabs continuously wet for a 7-day period. Intermittent wetting is not acceptable.
C. Use curing compound only where approved by Engineer.
   1. Do not use curing compound on concrete surfaces that will be painted.
D. Remove and replace concrete damaged by freezing.

10-2.08C(9) Field Quality Control

A. Concrete Samples:
   1. Provide concrete for making composite samples for testing slump, air content, and for making cylinders for determination of compressive strength.
   2. Prepare samples in accordance with ASTM C172. Select trucks or batches of concrete on a random basis.
   3. Samples may be obtained at the discharge chute of the truck or at the point of discharge into forms.
B. Sampling Frequency: One composite sample for each 100 cubic yards of structural concrete, or fraction thereof, of each concrete mixture placed in any one day.
C. Evaluation will be in accordance with ACI 301, Chapter 17 and Specifications.

D. Slump tests and concrete cylinders will be made by a testing service hired by the County on an as-needed basis at County discretion.

10-2.09 PAVEMENT AND CONCRETE RESTORATION

10-2.09A GENERAL

10-2.09A(1) Section Includes

A. The restoration of asphalt and concrete pavements and surfaces, including roadways, driveways, road shoulders, medians, traffic signal loops, pavement markings, curbs, gutters, sidewalks, and any other surfaces that may be damaged as a result of the work.

B. Most of the private residential sites have colored, stamped and/or otherwise specialized finishes or construction to the concrete, pavers and other hardscaping. Special attention to the protection and restoration of those hardscape improvements will be required.

C. In certain areas, milling/grinding of existing pavement will be required to the depths specified on the plans in order to replace damaged asphalt paving or provide full lane widths of new pavement overlaid to match the existing grades.

10-2.09A(2) Referenced Sections

A. Section 10-1.03 – Work Sequence and Constraints

B. Section 10-1.07 – Submittals

C. Section 10-2.05 – Trenching

10-2.09A(3) References

A. References in this Section to the State Standard Specifications means the latest edition of the Standard Specifications published by the State of California, Department of Transportation.

B. References in this Section to the County means the Improvement Standards published by County of Yolo.

10-2.09A(4) Submittals

A. Provide submittals in accordance with Section 10-1.07.

B. Submit information for materials to be used in restoring surfaces including mix designs, aggregates, asphalt, pavement fabrics, liquid priming asphalt, surface sealers, roadway striping products, and all other materials to be used for surface restoration.

C. Replacement or restoration of any privately-owned hardscape other than plain Portland Cement Concrete or hot mix asphalt paving will require a separate submittal of the proposed materials and finishes for each parcel/location, and will be subject to property owner approval.

10-2.09A(5) Definitions

A. Surface Restoration: The repair or replacement of surface materials back to pre-construction condition or better or as indicated due to the work or damaged as a result of the work.

10-2.09B PRODUCTS

10-2.09B(1) Materials

A. Provide all materials in accordance with:

1. State Standard Specifications, modified by this Section.
2. County Standard Specifications, as modified by this Section.

B. Aggregate base and sub-base materials:

1. State Standard Specifications, Section 26.

2. Class 2, 3/4 –inch maximum, unless otherwise indicated.

C. Asphalt concrete pavement materials:
   1. State Standard Specifications, Section 39.
   2. PG 64-10
   3. 1/2" max, medium grade aggregate

D. Tack coat:
   1. State Standard Specifications, Section 94.
   2. Grade SS-1h emulsified asphalt.

E. Seal coat:
   1. State Standard Specifications, Section 37.

F. Emulsified asphalt SS-1h, unless otherwise indicated

G. Traffic Stripes and Pavement Markers:
   1. State Standard Specifications, Sections 81 and 84.
   2. Thermoplastic alkyd-type for extrusion application producing an adherent reflectorized stripe capable of resisting deformation by traffic.

H. Concrete:
   1. State Standard Specifications, Section 90
   2. Class A, 6 sack

I. Specialty Concrete and hardscapes:
   1. Concrete mix design, including coloring or pigment types and amounts
   2. Finish methods and materials, including chemicals, curing agents and other materials added in the on-site construction process.
   3. Samples of stones, unit pavers, and finish aggregates to be incorporated.
   4. Test sample, subject to property owner pre-approval.

10-2.09C EXECUTION

10-2.09C(1) General

A. Reconstruct surfaces to pre-construction condition or better unless otherwise indicated, including curbs, gutters, sidewalks, driveways, road shoulders, medians, pavement, ditches, drainage ways, and related items that have been temporarily removed, damaged, or displaced as part of the work.

B. Reconstruct pavements in conformance with the State and County Standard Specifications.

C. Coordinate the trench surface pavement restoration with the requirements in Section 10-1.03 and as indicated on the Drawings.

D. Where existing pavement has been undermined, uplifted, gouged or structurally damaged by the Contractor's operations, additional grinding and repaving shall be required as noted on the project plans at no additional cost to the County.

E. Hydrostatic testing shall be complete and the test results approved prior to performance of the trench repaving and other pavement restoration within the road segment over and adjacent to the tested water system.

10-2.09C(2) Sawcutting and Pavement Grinding

A. Sawcut existing pavement surfaces prior to surface restoration.

B. Sawcut in straight lines parallel or perpendicular to existing roadway centerlines a minimum of 12 inches outside the edge of trench unless otherwise indicated.

C. Where sections of existing pavement remain that are less than 2 feet wide between the proposed sawcut and an existing edge of asphalt concrete, curb, or gutter, remove the existing remaining pavement and replace it as part of the pavement restoration.

D. Where pavement is damaged outside of sawcut lines, re-cut lines and remove damaged pavement.

E. Where voids develop under existing pavement to remain, re-cut lines, remove pavement and fill voids.

F. Where concrete flatwork or hardscaping is removed within five (5) feet of an existing joint, cut and remove to the near joint or as required to match finish and scoring patterns of the surrounding hardscape.

G. Where pavement grinding and repaving is required by the plans or these specifications, Contractor shall uniformly grind the existing pavement to the specified dimensions and remove and dispose of the grindings. Grinding shall be performed using equipment designed to maintain a controlled grade line over the required dimensions.

10-2.09C(3) Asphalt Concrete Pavement Surface Restoration

A. Place asphalt concrete in accordance with the following as modified herein:

1. State Standard Specification, Section 39.

B. Replace trench pavement to match the removed pavement thickness and aggregate base thickness unless otherwise indicated. Replace trench pavement to the extent indicated on the Drawings.

C. Test asphalt concrete per:

1. State Standard Specification, Section 39

D. Protect concrete in conformance with Section 90 of the State Standard Specifications.

10-2.09C(4) Restoration of Private Roads, Parking Areas, and Other Private Improved Areas

A. Reconstruct finished surfaces of private roads, parking areas, and other improved areas with the same materials and to not less than the pre-construction dimensions, unless otherwise indicated.

B. Reconstruct improvements damaged as part of the work to pre-construction condition or better.

C. Removal limits and finish shall be constructed to match the surrounding finish and patterns.

D. Asphalt Pavement: Match existing pavement thickness, or at least three (3) inches of asphalt concrete, whichever is greater.

E. Gravel, stone, or aggregate surfaces: Match existing thickness, or at least four (4) inches, whichever is greater.

10-2.09C(5) Restoration of Concrete Surfaces

A. Reconstruct concrete surfaces including curbs, gutter, sidewalks, wheelchair ramps, medians, valley gutters and any other concrete surface or structure temporarily removed, damaged, or displaced as part of the work in accordance with:

1. County Standard Specification Sections 4-9, Driveways, 4-16, Curb and Gutter, 4-17, Valley Gutter, 4-18 Sidewalk.
2. Concrete shall match color, texture and design of existing.
3. All concrete shall be replaced to nearest score mark or cold joint within five (5) feet of removed concrete.

10-2.09C(6) Seal Coat

A. Where required by County Standards, provide a seal coat over new pavement in accordance with:

1. State Standard Specification, Section 37.

10-2.09C(7) Traffic Stripes and Pavement Markings

A. Replace traffic stripes and pavement markings in conformance with the following as modified below:
   1. State Standard Specification, Section 84.
   2. County Standard, Section 4-32

B. Restore traffic stripes and pavement markings in accordance with the following schedule.
   1. Place cat tracking for the remaining striping the day following installation of the surface course.
   2. Place traffic striping and markings not more than one day following approval of the cat tracking by the roadway jurisdiction.
   3. Place pavement markings not more than 2 weeks following installation of the pavement.

C. Application:
   1. Apply thermoplastic material by extrusion method in a single, uniform layer.
   2. Use stencils in new condition without bends or damage when applying pavement markings.
   3. Completely coat the pavement surface and fill all surface voids with the marking material.
   4. Apply glass beads promptly to the molten thermoplastic material.
   5. Rates of application
      a. Stripes: 0.075 inch thick, ± 0.005 inch.
      b. Pavement markings: 0.125 inch thick, ± 0.005 inch
      c. Glass beads: 8 pounds per 100 square feet.

10-2.09C(8) Pavement Markers

A. Restore pavement markers in accordance with:
   1. State Standard Specification, Section 81

10-2.09C(9) Raising Manhole, Valve, and Other Utility Covers

A. Place temporary steel covers over manhole and valve boxes prior to placing permanent pavement.

B. Following pavement installation, remove the temporary covers and install grade rings as necessary to adjust the surface of the frames and covers to conform to the surface of the surrounding pavement surface.

C. Following adjustment of the frames and covers, neatly chip with a flat tool or sawcut the pavement around each frame to provide a smooth, even, vertical surface.

D. Install asphalt concrete in accordance with this Section, to provide a smooth surface around each frame, so that the frame, cover and pavement surfaces match.

10-2.10 RESTORATION OF IMPROVEMENTS

10-2.10A GENERAL

10-2.10A(1) Section Includes

A. Restoration of work areas after installation and construction of new facilities.

10-2.10A(2) Referenced Sections

A. Section 10-2.09 –Pavement and Concrete Restoration

10-2.10A(3) Submittals

A. Provide submittals in accordance with Section 10-1.07.

B. Replacement irrigation equipment:

1. Where the same make and model cannot be used: provide product data sheet for each component to be replaced for approval by the County and the property owner.

C. Replacement plantings:

1. Replacement trees and shrubs: provide actual proposed tree or shrub two (2) days in advance of the planned planting for inspection and approval by the County and the property owner.
2. Small plants and lawns; provide sample of each species to be replaced two (2) days in advance of the planned planting for inspection and approval by the County and the property owner.
3. Soil amendments: provide product data sheet for each soil amendment proposed for use in the planting.

10-2.10B PRODUCTS (NOT USED)

10-2.10C EXECUTION

10-2.10C(1) Structures

A. Take precautions to protect the integrity and usefulness of existing facilities.

B. If necessary, remove existing structures including curbs, gutters, pipelines, and utility poles, as necessary for the performance of the work.

C. Repair existing structures that are damaged as a result of the Work under this contract

D. Rebuild or replace the structures in as good a condition as originally found.

10-2.10C(2) Roads and Streets

A. Asphalt pavement that has been removed, broken, or damaged, or in which the ground has caved or settled during the work under this contract, shall be brought to original grade and section and resurfaced.

B. Before resurfacing material is placed, sawcut edges of pavement to provide clean solid vertical faces.

C. Complete pavement repair and concrete repair in accordance with 10-2.09 and in accordance with the requirements of the affected agencies and parties.

10-2.10C(3) Landscape Irrigation and Plantings

A. Restore cultivated or planted areas and other surface improvements damaged by construction as nearly as possible to their original condition.

B. Replace damaged plantings with new plantings of the same type or as acceptable to the Owner.

C. Damaged or removed irrigation systems shall be repaired immediately as needed to avoid damage to irrigated plantings from lack of water.

10-2.10C(4) Other Surface Improvements

A. Repair or replace existing guard posts, barricades, fences and all other surface improvements that are damaged.

10-2.10C(5) Protection of Existing Installations

A. Immediately repair or replace existing equipment, controls, structures, or facilities which are damaged as part of the Work.

B. Take measures that are necessary to ensure that construction debris and materials are kept out of the wastewater and storm drainage systems.

APPENDIX A

Geotechnical Report

GEOTECHNICAL REPORT

Bore and Jack Trenchless Culvert Crossing
NDM Water System Consolidation Project
Davis, California

May 2018

Prepared for:

WEST YOST ASSOCIATES

2020 Research Park Drive, Suite 100
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BCI File No. 3410.x
May 15, 2018

Mr. Asa Utterback, P.E.
West Yost Associates
2020 Research Park Drive, Suite 100
Davis, CA 95618

Subject: **GEOTECHNICAL REPORT**
Bore and Jack Trenchless Culvert Crossing
NDM Water System Consolidation Project
Yolo County, California

Dear Mr. Utterback,

Blackburn Consulting (BCI) is pleased to submit this Geotechnical Report for the Bore and Jack Trenchless Culvert Crossing which is part of the overall North Davis Meadows (NDM) Water System Consolidation Project in Yolo County, California. BCI prepared this report in accordance with our March 13, 2018 Task Order No. 5 to our February 12, 2014 Task Order Agreement.

Thank you for selecting BCI to be on your design team. Please call if you have questions or require additional information.

Sincerely,
BLACKBURN CONSULTING

Prepared by:

Daniel Contreras, E.I.T
Project Engineer

Reviewed by:

David J. Morrell, G.E., P.E
Senior Project Manager

REGISTERED PROFESSIONAL ENGINEER
DAVID J. MORRELL
No. GE 2843
GEOTECHNICAL
STATE OF CALIFORNIA

Copies: 1 to Addressee (PDF)

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1 INTRODUCTION

1.1 Purpose

Blackburn Consulting (BCI) prepared this geotechnical report for design and construction of the Bore and Jack Trenchless Culvert Crossing which is part of the overall North Davis Meadows Water System Consolidation Project in Yolo County, California. It contains descriptions of the surface and subsurface conditions, and geotechnical design/construction recommendations for the trenchless crossing.

BCI prepared this report for West Yost Associates (West Yost) and the project design team to use during design and construction of the trenchless crossing. This report shall not be used or relied upon by others, or for different locations or improvements without the written consent of BCI.

1.2 Scope of Services

To prepare this report, BCI:

- Discussed the proposed improvements with Mr. Asa Utterback with West Yost.
- Reviewed Preliminary 100% Submittal Plans for the project prepared and provided by West Yost. Sheet C20 displays the preliminary trenchless crossing plan/profile and approximate jacking/receiving pit locations.
- Observed the subsurface conditions in two borings drilled on April 12, 2018.
- Performed laboratory tests on soil samples obtained from the exploratory borings.
- Performed engineering analysis and calculations to develop our conclusions and recommendations.

1.3 Project and Site Description

Based on information provided by West Yost, we understand that the trenchless crossing project will consist of:

- Installation of approximately 64 lineal feet of 16” water line within 27” steel casing advanced by bore and jack methods beneath multiple large diameter reinforced pipe culverts in the southbound lane of County Road 99D, about ¾ miles north of Davis. Figure 1 (Vicinity Map) shows the general trenchless crossing location. Figure 2 (Site Plan) displays the approximate trenchless crossing alignment, preliminary jacking/receiving pit locations and existing culverts.
- The maximum depth of the crossing will be between 10 and 15 feet below the existing roadway surface.

County Road 99D is a two-lane paved road with narrow paved shoulders at the trenchless crossing location. A shallow unlined drainage ditch parallels the roadway and trenchless crossing alignment on the west, and crosses over the alignment via multiple reinforced concrete pipe culverts with County Road 99D. The ditch contained dense vegetation including marsh vegetation at the time of our April 2018 subsurface exploration. We did not observe surface water in the ditch but the dense vegetation obscured the bottom of the ditch from view so there could have been several inches of surface water that went unnoticed.

2 SUBSURFACE CONDITIONS

2.1 Subsurface Exploration and Soil Conditions

BCI drilled, logged and sampled two borings on April 12, 2018 within the preliminary jacking and receiving pit locations. Figure 2 displays the approximate boring locations. The boring logs are included in Appendix A.

Our subcontractor, Taber Drilling, drilled the borings to depths approximately 19.5-20 feet below existing grade using 6-inch diameter hollow stem auger. Soil samples were obtained at various intervals using a 3.0-inch O.D. Modified California (MC) sampler (equipped with 2.4-inch diameter liners) and a 2.0-inch O.D. Standard Penetration Test (SPT) sampler. The sampler was driven with an automatic hammer, weighing 140-pounds and falling approximately 30-inches per blow. Our project engineer logged the borings and retained samples for laboratory testing.

In Boring B1, we encountered medium stiff to stiff, lean clay to sandy lean clay to the depth explored.

In Boring B2, the existing pavement section consisted of approximately 1-foot of asphalt concrete over about 1.5 feet of aggregate base. Beneath the pavement section, we encountered stiff to very stiff lean clay to a depth of approximately 15 feet. Beneath the clay, we observed medium dense clayey sand to a depth of about 18 feet, underlain by medium dense poorly-graded sand with clay and gravel to the 19.5-foot depth explored.

2.2 Groundwater and Seepage

We did not observe static groundwater or seepage in any of our borings drilled on April 12, 2018. We reviewed groundwater level data for nearby wells available at the California Department of Water Resources website (http://www.water.ca.gov/waterdatalibrary/) and using the Groundwater Information Center Interactive Map Application (https://gis.water.ca.gov/app/gicima/). Based on this information, the depth to groundwater at the site historically ranges from 20 to 60 feet and is seasonally highest in the winter/spring months.

We anticipate that during or shortly following periods when surface water is present in the adjacent drainage ditch, seepage could be encountered in excavations at or below the surface water level or below the ditch bottom level shortly after it dries up.

Groundwater and seepage levels can fluctuate due to changes in precipitation, water levels in the nearby drainage ditch, irrigation, pumping of wells, and other factors.

3 FIELD AND LABORATORY TESTS

We performed the following laboratory tests on representative soil samples from the exploratory borings:

- Unit weight and moisture content tests for in-situ soil property characterization.
- Plasticity index and sieve analysis for soil classification.

BCI performed field and laboratory pocket penetrometer testing on cohesive soil samples to evaluate unconfined compressive strength.

Appendix B presents the laboratory test results. The boring logs in Appendix A also include the laboratory and pocket penetrometer test results.

4 GEOTECHNICAL CONCLUSIONS AND RECOMMENDATIONS

4.1 Pit Excavation and Shoring Considerations

On a preliminary basis, we generally anticipate that temporary excavation sloping and shoring for Type B soil requirements (Federal Register, 29 CFR, Part 1926, Subpart P; Occupational Safety and Health Standards – Excavations) will be necessary. We based this soil type classification on the subsurface conditions encountered in our borings including the lack of groundwater or seepage encountered. If seepage from the existing drainage ditch is encountered during construction excavations, Type C soil requirements would apply.

All excavations must be sloped, shored, and/or shielded in accordance with current Cal/OSHA requirements. The contractor is responsible for site safety, final excavation and shoring design (including OSHA soil type determinations) and construction, based on actual excavation conditions encountered during construction. The contractor is also responsible for the protection of existing facilities and improvements. The impact of construction traffic vibrations, actual soil conditions exposed in the open excavations, seepage and/or groundwater conditions, surcharges adjacent to excavations, proximity of excavations to existing structures, and other factors that may promote excavation wall instability or cause excavation related damage to existing facilities and improvements must be evaluated at the time of construction and excavation sloping/shoring methods adjusted accordingly. We recommend that a settlement monitoring program be implemented during construction to monitor sensitive facilities adjacent to deep excavations.

4.2 Pit Bottom Support

Although our borings did not encounter soft soil, it could be encountered during jacking/receiving pit excavation given potential variability of soil conditions within the planned excavation areas and/or if seepage from the drainage ditch is encountered during excavation. Notify BCI for review/mitigation recommendations if unsuitable excavation subgrade is encountered. Typical mitigation may include replacement of unsuitable subgrade with ¾-inch minus crushed rock (6-18 inches depending on level of instability) wrapped in geotextile stabilization fabric to achieve a stable and non-yielding subgrade to support construction equipment.

4.3 Pit Backfill

The on-site soil excavated from the pits may be used as pit backfill provided it is free of debris and visible concentrations of vegetation, excessive organics (>2% organic matter per ASTM D2974 test method) and has a maximum particle size of 1 inch**.**

Imported fill, if required must meet the following requirements:

- No concentrations of organics, debris, or other deleterious materials.
- 100% passing the 1-inch sieve, 80-100% passing the ¾-inch sieve, 50-100% passing the No. 4 sieve, and at least 20% passing the No. 200 sieve.
- Plasticity Index less than or equal to 12, per ASTM D4318.

Place and compact pit backfill as follows:

1. Place backfill in loose lifts no thicker than 12 inches prior to compaction.
2. Uniformly moisture condition backfill to 0% to 2% above the optimum moisture content.
3. Compact backfill to at least 92% relative compaction, per ASTM D1557. Increase backfill relative compaction to at least 95% relative compaction within the upper 6 inches of finish pavement subgrade.

Excessively over-optimum (wet) soil conditions can make proper pit backfill compaction difficult or impossible. We anticipate that the excavated material will require drying back to achieve a moisture content suitable for proper compaction in the Winter through late Spring months, or at any time of year when water or wet soil is present within the adjacent drainage ditch. If the construction schedule or weather do not facilitate drying the excavated material, import fill may be necessary to backfill the pits.

4.4 Pit Excavation Dewatering

Refer to Section 2.2 (Groundwater and Seepage) for information related to the potential for encountering seepage and groundwater during excavations and bore and jack trenchless pipeline installation for the project. If seepage and/or groundwater is encountered in pit excavations composed entirely of the native clay or clayey sand, then it is possible that sump pumps could be used to dewater the excavations. The contractor is responsible for selecting the actual dewatering methods based on the conditions encountered.

4.5 Soil Related Design and Construction Considerations

The proposed jack and bore installation appears geotechnically feasible at this location. Based on our subsurface exploration and preliminary casing installation depth (10-15 feet below existing grade), the steel casing will be installed primarily through medium stiff to very stiff lean clay to sandy lean clay and medium dense clayey sand. We encountered medium dense clean sand with clay and gravel in Boring B2 at depths of 17-19.5 feet. Pipe jacking through dissimilar soil types/strengths can present installation difficulties and affect proper alignment of the casing. For this project, the designer should avoid casing alignments that pass through both the clean sand and clay layers. Since the elevation of the clean sand layer could vary along the casing alignment, consideration should be given to raising the casing elevation as high as practical within the clay stratum.

The contractor is responsible for utilizing bore and jack methods that do not cause detrimental settlement to the pipeline, existing facilities, and ground surface above, and that maintain the designed horizontal and vertical pipe alignments and tolerances. At a minimum, the contractor should:

- Implement a survey monitoring program during construction to monitor ground surface movement (lateral and vertical) during the installation. At a minimum, surface control points should be established and monitored along and within 15 feet of the pipe centerline and jacking/receiving pits.
- Perform pre/post construction surveys and take photographs/videos of existing facilities including the culvert crossing within 15 feet of the trenchless crossing and jacking/receiving pits.
- Have appropriate contingency plans and equipment in place for stabilizing the casing excavation face if excessive seepage conditions occur or caving/flowing sands are encountered. Contingency plans may include a closed-face excavation system, face shield at the leading edge of the first pipe casing, use of grouting techniques, dewatering of the trenchless alignment, limiting the extent of the excavation face beyond the end of the casing pipe.
- Have contingency plans in place for immediately addressing damage to any sensitive facilities and roadway that is caused by the trenchless installation operation.

5 RISK MANAGEMENT

Our experience and that of our profession clearly indicates that the risks of costly design, construction, and maintenance problems can be significantly lowered by retaining the geotechnical engineer of record to provide additional services during design and construction. For this project, BCI should be retained to:

- Review and provide comments on the civil plans and specifications for the trenchless pipeline installation prior to construction.
- Monitor construction to check and document our report assumptions. At a minimum, BCI should monitor and test during pit excavation and backfill.
- Update this report if design changes occur, 2 years or more lapse between this report and construction, and/or site conditions have changed.

If we are not retained to perform the above applicable services, we are not responsible for any other party's interpretation of our report, and subsequent addendums, letters, and discussions.

6 LIMITATIONS

BCI performed services in accordance with generally accepted geotechnical engineering principles and practices currently used in this area. Where referenced, we used ASTM or Caltrans laboratory test standards as a general (not strict) *guideline* only. We do not warranty our services.

BCI based this report on the current site conditions. We assumed the soil and ground water conditions encountered in our borings are representative of the subsurface conditions across the site. Actual conditions between these locations could be different.

Our scope did not include evaluation of on-site hazardous material, flood potential, aerial photograph review, or biological pollutants. Please contact BCI if you would like an evaluation of one or more of these potential issues.

Appendix A presents our exploratory boring logs. The lines designating the interface between soil types are approximate. The transition between soil types may be abrupt or gradual. Our recommendations are based on the final logs, which represent our interpretation of the field logs, laboratory test results and general knowledge of the site and geological conditions.

Refer to Appendix C (Important Information about This Geotechnical Engineering Report, Geoprofessional Business Association, 2016) for additional limitations regarding this report. Modern design and construction is complex, with many regulatory sources/restrictions, involved parties, construction alternatives, etc. It is common to experience changes and delays. The owner should set aside a reasonable contingency fund based on complexities and cost estimates to cover changes and delays.

GEOTECHNICAL REPORT

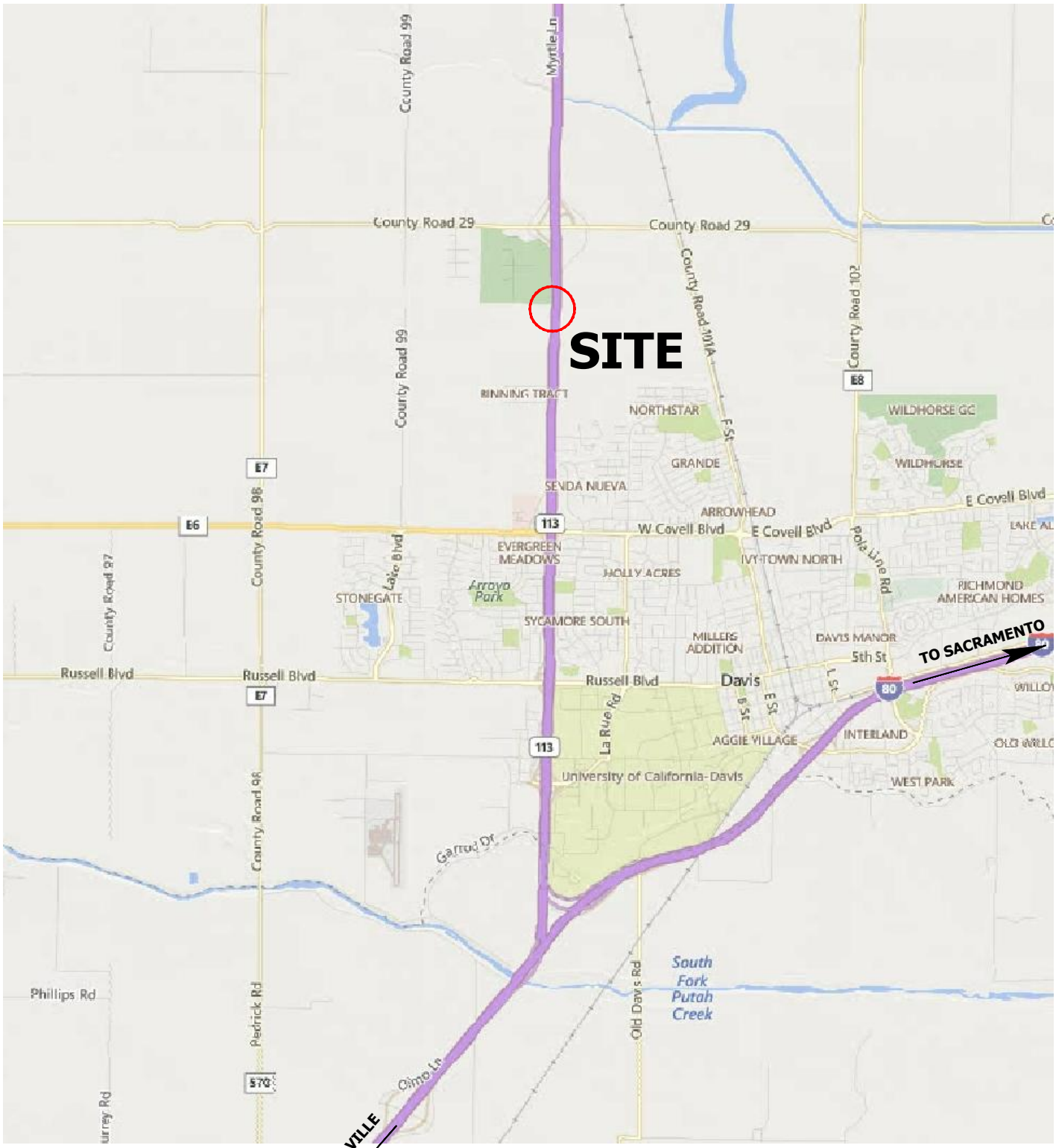
Bore and Jack Trenchless Culvert Crossing
NDM Water System Consolidation Project

Davis, California

May 2018

FIGURES

Vicinity Map
Site Plan



5/15/2018 3410.x Fig1 NDM Bore and Jack.dwg

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VICINITY MAP

BORE AND JACK TRENCHLESS CULVERT CROSSING

NDM Water System Consolidation Project
Yolo County, California

File No. 3410.x

May 2018

Figure 1

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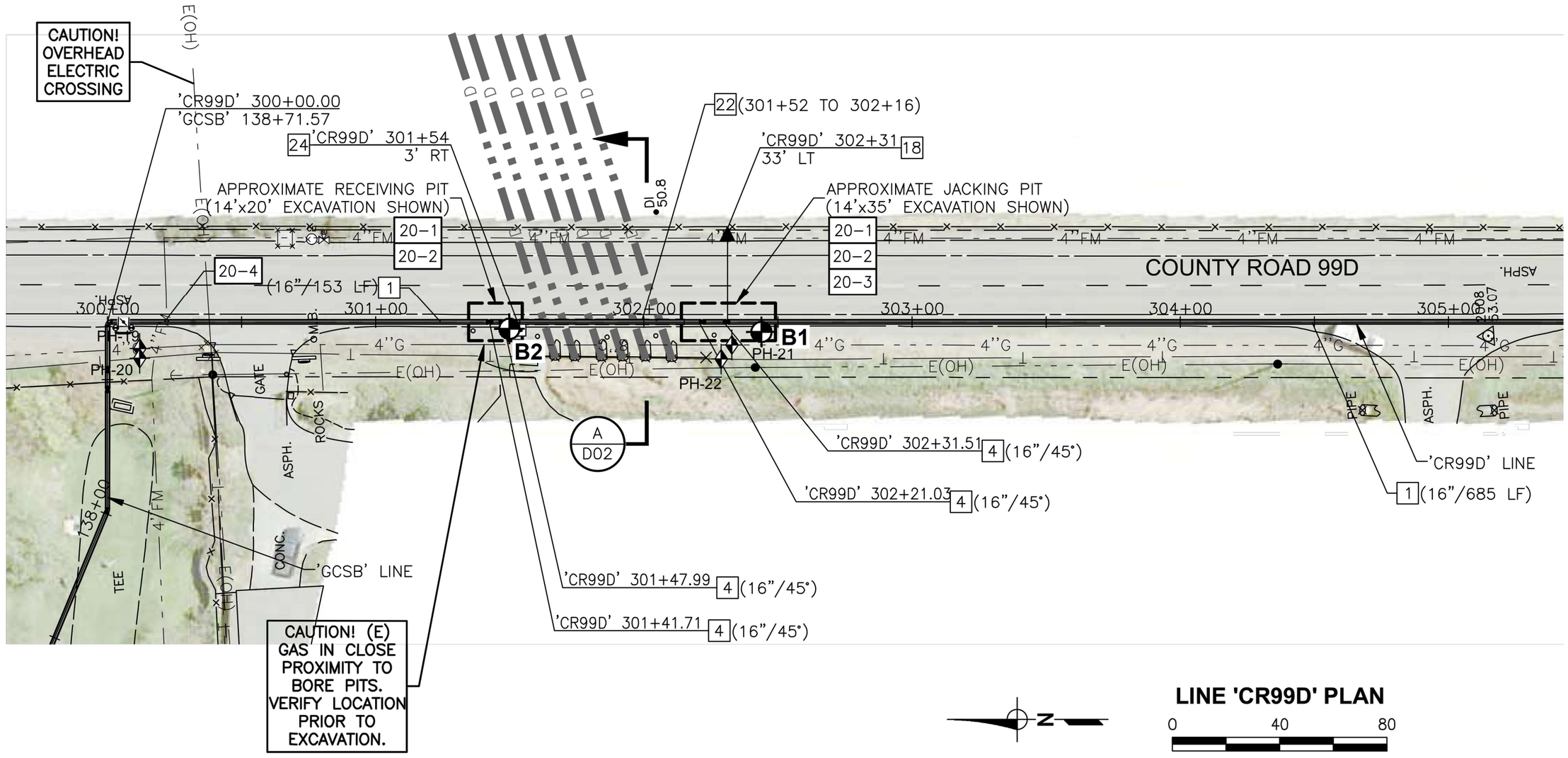

N

LINE 'CR99D' PLAN

0 40 80

SCALE IN FEET
1" = 40'

LEGEND

B1 Approximate Boring Location

Source: Preliminary / 100% Submittal plans, Drawing C20, Sheet 30 of 35, by West Yost Associates. Plot date January 14, 2018.

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SITE PLAN
BORE AND JACK TRENCHLESS CULVERT CROSSING
NDM Water System Consolidation Project
Yolo County, California

File No. 3410.x
May 2018
Figure 2

5/15/2018 3410.x Fig2 NDM Bore and Jack.dwg

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GEOTECHNICAL REPORT

Bore and Jack Trenchless Culvert Crossing
NDM Water System Consolidation Project

Davis, California

May 2018

APPENDIX A

Boring Log Legend
Boring Logs

UNIFIED SOIL CLASSIFICATION (ASTM D 2487)

MATERIAL TYPES	CRITERIA FOR ASSIGNING SOIL GROUP NAMES			GROUP SYMBOL	SOIL GROUP NAMES
COARSE-GRAINED SOILS >50% RETAINED ON NO. 200 SIEVE	GRAVELS >50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS <5% FINES	Cu ≥ 4 AND 1 ≤ Cc ≤ 3	GW	WELL-GRADED GRAVEL
			Cu < 4 AND/OR 1 > Cc > 3	GP	POORLY-GRADED GRAVEL
		GRAVELS WITH FINES >12% FINES	FINES CLASSIFY AS ML OR MH	GM	SILTY GRAVEL
			FINES CLASSIFY AS CL OR CH	GC	CLAYEY GRAVEL
	SANDS <50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN SANDS <5% FINES	Cu ≥ 6 AND 1 ≤ Cc ≤ 3	SW	WELL-GRADED SAND
			Cu < 6 AND/OR 1 > Cc > 3	SP	POORLY-GRADED SAND
		SANDS WITH FINES >12% FINES	FINES CLASSIFY AS ML OR MH	SM	SILTY SAND
			FINES CLASSIFY AS CL OR CH	SC	CLAYEY SAND
FINE-GRAINED SOILS >50% PASSING NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT <50	INORGANIC	PI>7 AND PLOTS ON OR ABOVE "A" LINE	CL	LEAN CLAY
			PI>4 AND PLOTS BELOW "A" LINE	ML	SILT
		ORGANIC	LL (oven dried)<0.75/LL (not dried)	OL	ORGANIC CLAY OR SILT
	SILTS AND CLAYS LIQUID LIMIT >50	INORGANIC	PI PLOTS ON OR ABOVE "A" LINE	CH	FAT CLAY
			PI PLOTS BELOW "A" LINE	MH	ELASTIC SILT
		ORGANIC	LL (oven dried)<0.75/LL (not dried)	OH	ORGANIC CLAY OR SILT
HIGHLY ORGANIC SOILS		PRIMARILY ORGANIC MATTER, DARK COLOR, ORGANIC ODOR		PT	PEAT

NOTE: $Cu=D_{60}/D_{10}$

$Cc=(D_{30})^2/ D_{10} \times D_{60}$

BLOW COUNT

The number of blows of a 140-lb. hammer falling 30-inches required to drive the sampler the last 12-inches of an 18-inch drive. The notation 50/4 indicates 4-inches of penetration achieved in 50 blows.

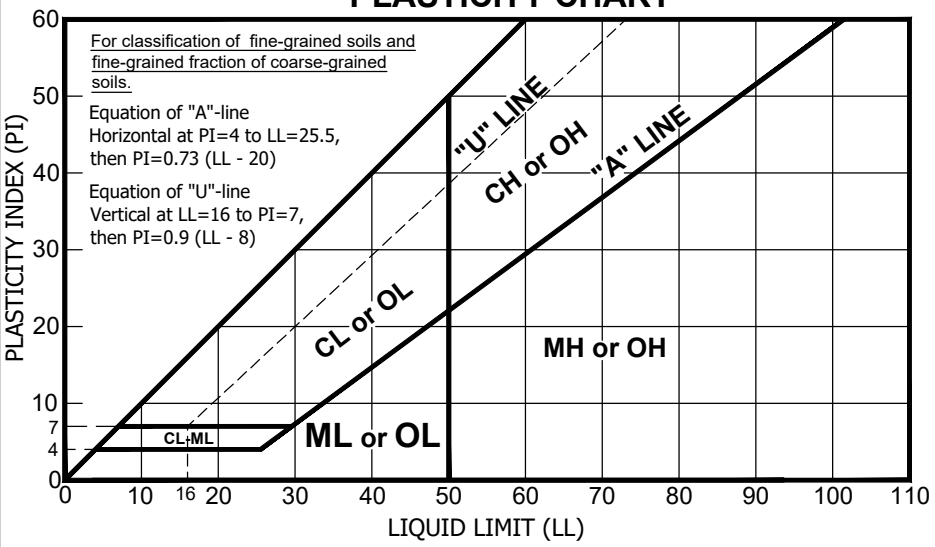
SAMPLE TYPES

- Auger or backhoe cuttings
- Modified California
- Shelby tube
- Rock core
- Standard Penetration (SPT)
- Direct Push

ADDITIONAL TESTS

- C - Consolidation
- CP - Compaction Curve
- CR - Corrosivity Testing
- CU - Consolidated Undrained Triaxial
- DS - Direct Shear
- EI - Expansion Index
- P - Permeability
- PA - Partical Size Analysis
- PI - Plasticity Index
- PP - Pocket Penetrometer
- R - R-Value
- SE - Sand Equivalent
- SG - Specific Gravity
- SL - Shrinkage Limit
- SW - Swell Potential
- TV - Pocket Torvane Shear Test
- UC - Unconfined Compression
- UU - Unconsolidated Undrained Triaxial

PLASTICITY CHART



GROUND WATER LEVELS

- Later water level after drilling
- Water level at time of drilling

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BORING LOG / TEST PIT LEGEND AND SOIL DESCRIPTIONS

LOG OF BORING B1

PROJECT: NDM Bore and Jack Culvert Crossing
FILE NO.: 3410.X
LOCATION: County Road 99D, Yolo Co., CA
CLIENT: West Yost
DRILLING DATE: 4-12-18
LOGGED BY: DWC
CHECKED BY: DJM
DRILLING METHOD: Hollow-Stem Auger
HAMMER TYPE: Safety semi-automatic drop (140#/ 30")
SURFACE ELEVATION (ft): 52
WATER DEPTH (ft): NA
WATER READING DATE: 4/12/2018

FIELD							LABORATORY						
DEPTH (FEET)	SAMPLE	SAMPLE NO.	FIELD BLOW COUNT	POCKET PEN (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	% <200 SIEVE	PLASTICITY INDEX	LIQUID LIMIT	R VALUE	OTHER TESTS
						SANDY Lean CLAY (CL); medium stiff; dark brown; moist							
						Lean CLAY (CL); medium stiff; dark brown; moist							
5		1	7	0.75			92	25					
						SANDY Lean CLAY (CL); medium stiff to stiff; dark yellowish brown; moist							
		2	12	1.25									
10		3	6	0.5			107	19	68	18	33		
						Lean CLAY (CL); stiff; dark yellowish brown; moist							
15		4	12	1.75			95	27					
		5	14	1.25									
20						Boring terminated at 20' BGS No groundwater encountered Backfilled with cement grout and native cuttings							

LOG OF BOREHOLE -- GEOTECHNICAL TEMPLATE.GPJ THE LIBRARY_2016.GLB 5/15/18

LOG OF BORING B2

PROJECT: NDM Bore and Jack Culvert Crossing
FILE NO.: 3410.X
LOCATION: County Road 99D, Yolo Co., CA
CLIENT: West Yost
DRILLING DATE: 4-12-18
LOGGED BY: DWC
CHECKED BY: DJM
DRILLING METHOD: Hollow-Stem Auger
HAMMER TYPE: Safety semi-automatic drop (140#/ 30")
SURFACE ELEVATION (ft): 52
WATER DEPTH (ft): NA
WATER READING DATE: 4/12/2018

FIELD							LABORATORY						
DEPTH (FEET)	SAMPLE	SAMPLE NO.	FIELD BLOW COUNT	POCKET PEN (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	% <200 SIEVE	PLASTICITY INDEX	LIQUID LIMIT	R VALUE	OTHER TESTS
						ASPHALT Concrete (AC)							
						AGGREGATE BASE							
						Lean CLAY (CL); stiff; very dark brown; moist							
5		1	15	1.25									
						Lean CLAY with SAND (CL); very stiff; dark yellowish brown; moist;							
10		2	23	3.5									
		3	5	2.0									
		4	10	1.5		CLAYEY SAND (SC); medium dense; dark yellowish brown; moist; lenses of SANDY Lean CLAY	97	21	46	9	26		
15						Poorly-graded SAND with CLAY and GRAVEL (SP-SC); medium dense; olive gray; moist							
		5	17										
20						Boring terminated at 19.5' BGS No groundwater encountered Backfilled with cement grout and native cuttings Patched AC							

LOG OF BOREHOLE -- GEOTECHNICAL TEMPLATE.GPJ THE LIBRARY_2016.GLB 5/15/18

GEOTECHNICAL REPORT

Bore and Jack Trenchless Culvert Crossing
NDM Water System Consolidation Project

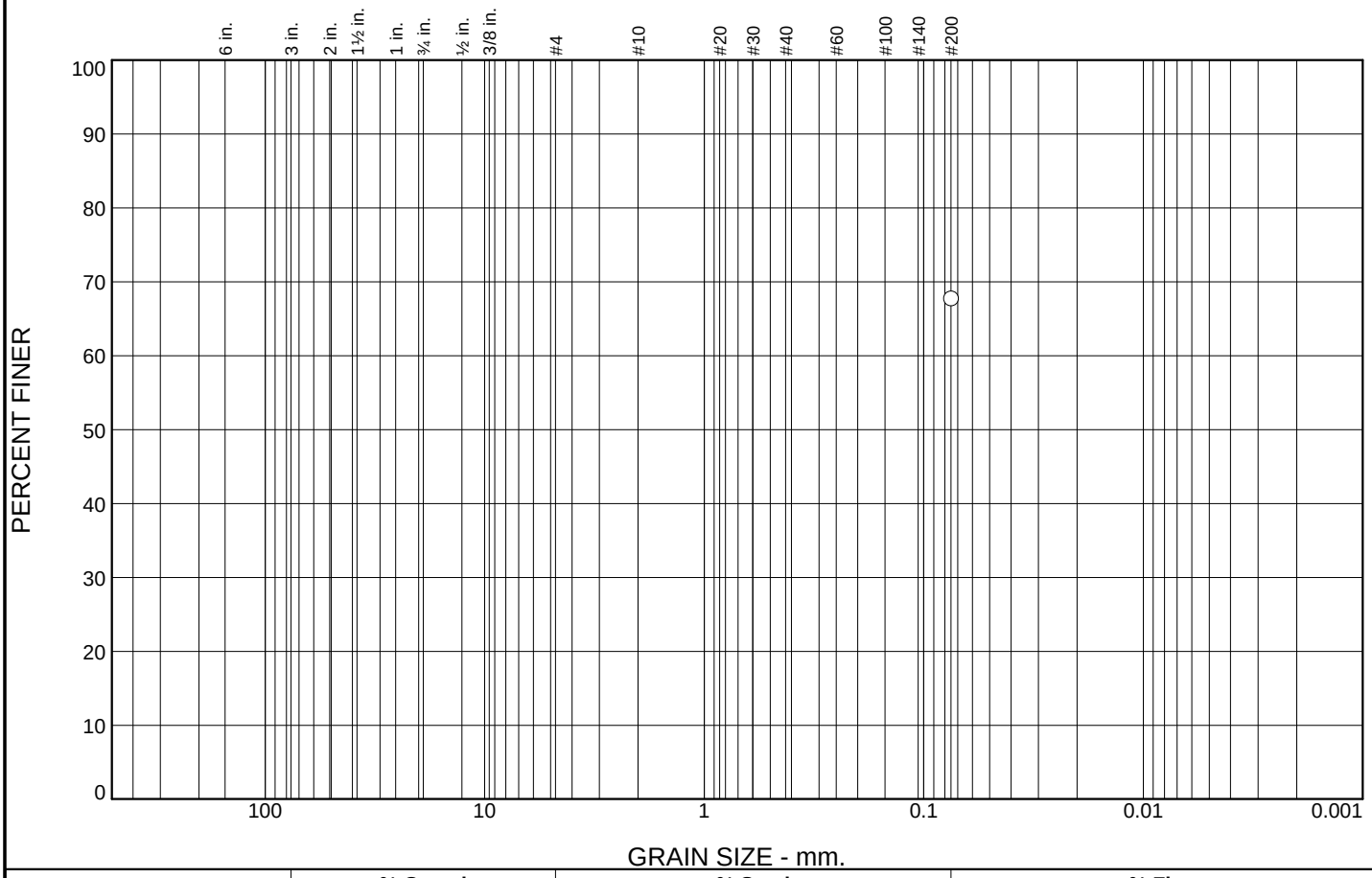
Davis, California

May 2018

APPENDIX B

Laboratory Test Results

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						67.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	67.8		

* (no specification provided)

Soil Description

SANDY lean CLAY, dark yellowish brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO=

Remarks

Source of Sample: B1 **Depth:** 9.5-10.0'
Sample Number: 2C **Date:**

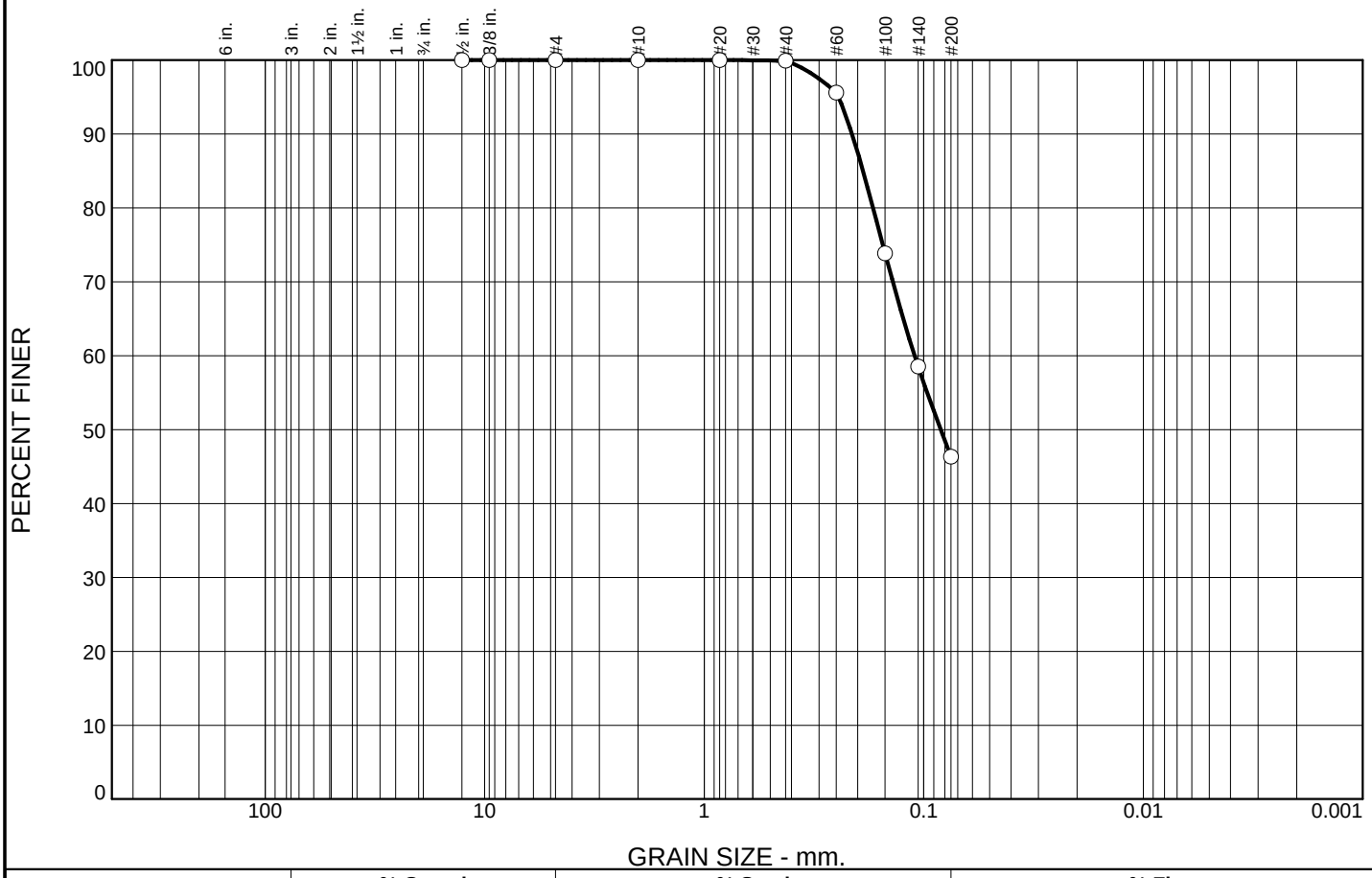
Blackburn Consulting

W. Sacramento, CA

Client: West Yost Associates
Project: NDM Bore-and-Jack

Project No: 3410.X **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.1	53.6	46.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2"	100.0		
3/8"	100.0		
#4	100.0		
#10	100.0		
#20	100.0		
#40	99.9		
#60	95.6		
#100	73.8		
#140	58.5		
#200	46.3		

* (no specification provided)

Soil Description

CLAYEY SAND, yellowish brown

Atterberg Limits

PL= 17 LL= 26 PI= 9

Coefficients

D_{90}= 0.2120 D_{85}= 0.1890 D_{60}= 0.1100
D_{50}= 0.0837 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SC AASHTO= A-4(1)

Remarks

Source of Sample: B2 **Depth:** 14.5-15.0'
Sample Number: 4B **Date:** 4/25/18

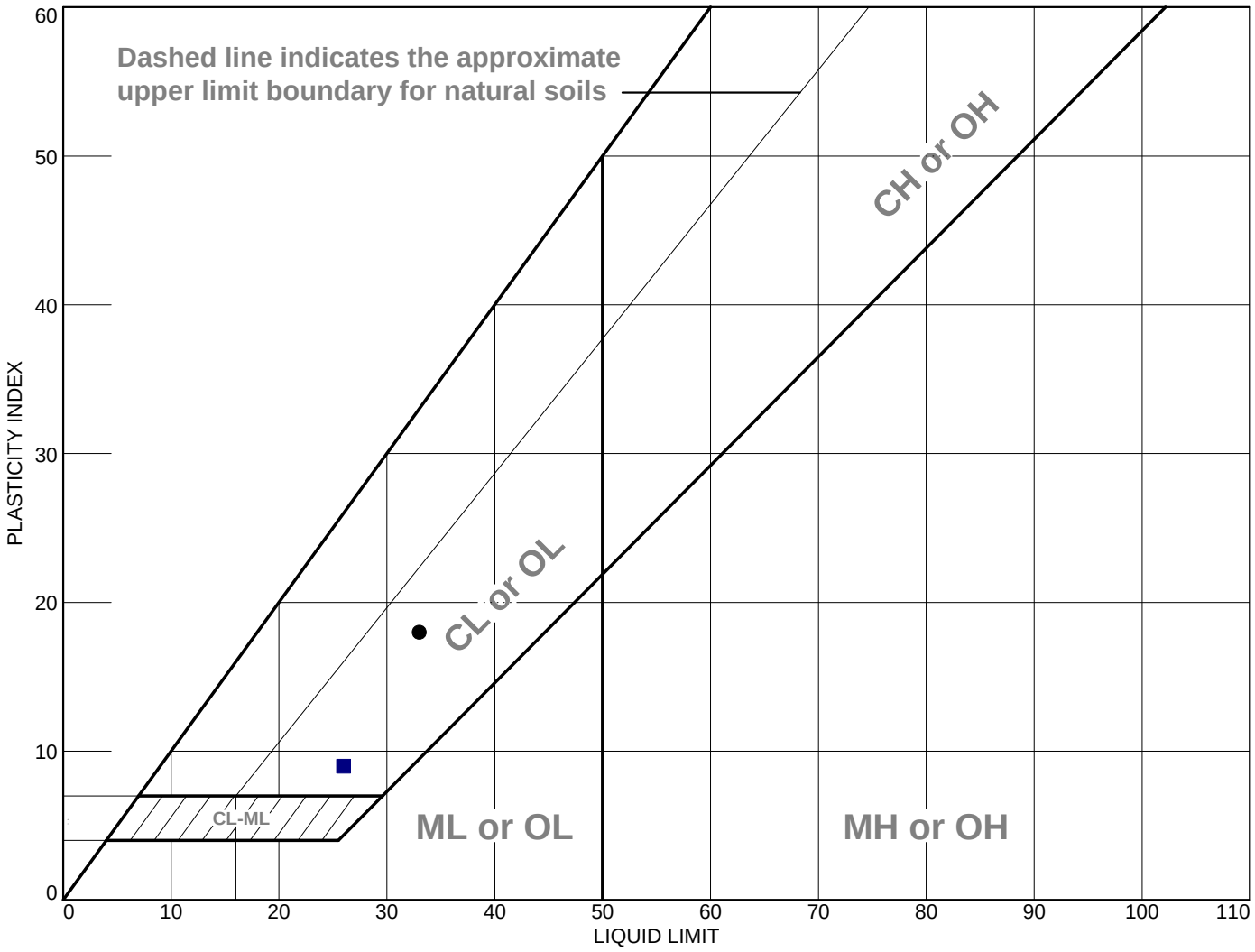
Blackburn Consulting

W. Sacramento, CA

Client: West Yost Associates
Project: NDM Bore-and-Jack

Project No: 3410.X **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean CLAY, brown	33	15	18	---	---	CL
■	CLAYEY SAND, yellowish brown	26	17	9	99.9	46.3	SC

Project No. 3410.X **Client:** West Yost Associates

Project: NDM Bore-and-Jack

● **Source of Sample:** B1 **Depth:** 10.0-11.5' **Sample Number:** 3

■ **Source of Sample:** B2 **Depth:** 14.5-15.0' **Sample Number:** 4B

Remarks:

Blackburn Consulting

W. Sacramento, CA

Figure

GEOTECHNICAL REPORT

Bore and Jack Trenchless Culvert Crossing
NDM Water System Consolidation Project
Davis, California

May 2018

APPENDIX C

Important Information about This Geotechnical Engineering Report, Geoprofessional Business Association, 2016

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled*. No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be*, and, in general, *if you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed*. The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.*

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration.*** Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

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APPENDIX B

City/County Agreement