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NAPA BERRYESSA RESORT IMPROVEMENT DISTRICT

SEWER LIFT STATION 2
PUMP REPLACEMENT PROJECT
NB 19-05

TECHNICAL SPECIFICATIONS

September 2019

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NAPA BERRYESSA RESORT IMPROVEMENT DISTRICT

LIFT STATION 2 – PUMP REPLACEMENT PROJECT

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SECTION 01010

SUMMARY OF WORK

PART 1 GENERAL

1.1 PROJECT DESCRIPTION

A. The District as used in the Technical Specifications is defined as the Napa Berryessa Resort Improvement District (NBRID). The office for the District is located at 804 First Street, Napa, CA 94559.

B. The work includes, but is not limited to, furnishing all labor, equipment, materials, and supplies for the installation of the new pump system purchased for the NBRID Lift Station No. 2 Pump Replacement Project. The Site has been cleared for construction, however, additional demolition/removal of existing equipment, piping, valves, controls and associated appurtenances may be necessary. Work includes installation of a pre-purchased pump system, electromagnetic flowmeter, radar level instrument, air release valve, two (2) check valves and controls with alarm system at the Lift Station; furnishing and installing aboveground sanitary sewer piping as necessary, including fittings, adding an interior shotcrete liner to an existing dry pit, modifying a 6 ft x 8 ft hatch with new supports, hinged access and plate covers and associated piping and appurtenances; installation of provided instrumentation equipment; process control programming and alarm dialer configuration; electrical wire and connections to an existing generator automatic transfer switch and pump motor; instrumentation wire connections, conduit for electrical and instrumentation, site restoration; start-up and testing of all equipment; and all other work described in the plans and specifications in accordance with the Contract Documents.

C. Equipment and products for this project may be stored at the NBRID Lift Station No. 2 site. The Contractor shall coordinate with the District on the transfer of equipment and materials from the storage site to the lift station sites.

D. Questions regarding the work should be directed to the Engineer.

E. The Contractor shall coordinate all related work with affected parties including, but not limited to the Napa Berryessa Resort Improvement District, and equipment manufacturer's representative.

1.2 SEQUENCE AND SPECIAL CONDITIONS

A. After the Notice to Proceed has been issued, the Contractor may begin work on the procurement of materials and services. These include submittal preparation, and purchase of materials, and delivery and storage of materials. Purchased materials may be submitted for payment after they are stored and the District has access for inspection. The Contractor is responsible for any material loss or damage.

B. Coordination with Others: The Contractor shall coordinate work activities and schedule equipment start-up, testing and training with the equipment manufacturer's representative.

C. Pre-bid Conference. A pre-bid conference will be held to afford all bidders an opportunity to request information or interpretations of the drawings and specifications and to visit the sites. The time of this meeting and inspection of the construction site is provided in the Notice to Contractors.

D. All costs of construction staging, phasing, or sequencing shall be included in the Contractor's bid. No additional compensation will be made therefore.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Contractor shall receive, unload, and store in a secure place all materials and equipment required for the work. The storage facilities and methods of storing shall be designed to keep such materials and equipment in a new condition, free from deterioration and protected from damage by weather or construction activities. Such facilities and methods are subject to the Engineer's approval and the Engineer shall have the right to inspect all storage facilities and stored materials and equipment at reasonable times. Materials and equipment may be suitably stored by Contractor at the NBRID Lift Station No. 2 site in an area designated by the Owner. Coordinate with the Owner to provide electricity if required due to weather conditions. Contractor shall keep complete and accurate records of all materials and equipment received, stored, and delivered for use in the work. Such records shall be made available for inspection by the Engineer.

1.4 ARCHAEOLOGICAL AND HISTORICAL DISCOVERIES

A. The Contractor shall immediately stop work if paleontological, archaeological or historical remains (including burials or skeletal material) are encountered during performance of this contract. The Contractor shall promptly notify the designated Inspector or the Engineer if the Inspector is absent or one was not designated for this contract.

B. After receiving such notification, the Engineer will contact an Archaeologist so that the provisions of 36 CFR 800.7 (Resources Discovered During Construction) and other relevant laws are followed. Work will cease in the immediate vicinity until permitted by written order from the Engineer. The Contractor may proceed with work in other areas as approved by the Archaeologist.

1.5 DRAWINGS

A. Contractor shall use approved Contract Drawings titled "Napa Berryessa Resort Improvement District Lift Station No. 2 Pump Replacement Project" dated September 2019. Any questions shall be brought to the attention of the Engineer. Any revisions or clarifications to the drawings will be issued in writing.

1.6 COORDINATION OF DOCUMENTS GOVERNING THE WORK

A. All discrepancies in the Drawings shall be brought to the attention of the Engineer for resolution. Blueprints shall not be scaled to obtain missing or conflicting dimensions. The Contractor shall keep a check on dimensions and details as the work progresses and any errors or discrepancies discovered shall be promptly reported to the Engineer.

B. In cases of conflict between drawings, specifications, contract provisions, supplemental agreements and provisions, the provisions of the contract shall govern. In all cases of dispute in respect to such conflict or as to what part or parts of the specifications apply to any given parts of the Work, decisions shall be made by the Engineer.

1.7 COPIES OF DRAWINGS AND SPECIFICATIONS

A. The Contractor will be furnished with hard copies and electronic copies of the drawings and specifications, and will be responsible for providing hard copies of the specifications he/she may require to carry on the work in a satisfactory manner. The Contractor shall also be responsible for providing copies of the specifications to all subcontractors and trades performing work under this contract.

1.8 EXISTING UTILITIES AND OBSTRUCTIONS

A. Unless otherwise permitted by the District, the Contractor shall conduct his operations in a manner that will permit continuous operation of all utilities. The locations of existing underground utilities and structures, as can be determined from record information, have been shown on the Drawings. The Contractor is responsible to contact local utilities agencies at least 72 hours (or with more advance notice if required by the utility company or local agency) before excavation so that utilities may be marked in the field. Locations of existing utilities as shown on the Drawings are only approximate. The Engineer assumes no responsibility for the accuracy or completeness of said data, which is offered solely for the convenience of the Contractor.

B. It shall be the responsibility of the Contractor to verify the exact location of all utilities. This verification shall be done far enough ahead of excavation to ensure that the excavations can be located as shown and that the planned line and grade will clear any obstructions. Prior to the start of construction, the locations of crossings of existing utilities shall be exposed to verify that planned line and grade are adequate to provide minimum clearance.

C. The Contractor shall relocate any utility conflicting with line and grade of the new utilities and facilities. Contractor shall prepare a plan for relocation of any utility. Said plan must be reviewed and approved by the Engineer prior to commencement of the work. Disruption of utility services shall be kept to a maximum of 2 hours total for any one service.

D. Any changes required in line or grade of the new facilities, due to interferences with existing utilities or other obstructions, shall be performed by the Contractor and shall have prior approval of the Engineer. If the Contractor fails to adequately verify the locations of utilities or tie-ins, and such failure necessitates additional fittings and /or the removal of previously laid pipe, to adjust the line or grade, then the cost of such changes shall be borne entirely by the Contractor.

1.9 NOTIFICATION

A. The Contractor shall notify affected residents and property owners in writing a minimum of 72 hours (excluding weekends and holidays) in advance of the work and in advance of

any street and driveway closure. The written notice shall detail the streets, limits of work and hours of work. The Contractor shall provide a sample notification form prior to the beginning of work to the Engineer for review and approval.

1.10 RESTORATION OF EXISTING IMPROVEMENTS

A. Existing paving, curbs, gutters, sidewalks, utilities, landscaping, irrigation systems, planting or other improvements removed, damaged or disturbed due to the installation of new work and appurtenances shall be replaced in kind to the satisfaction of the Engineer at no additional expense to the District.

1.11 PROJECT MEETINGS

A. Pre-construction Meeting

1. A preconstruction meeting will be held after execution of the Contract and before construction is started. Scheduling and location of the Pre-Construction Conference shall be confirmed with the District and the Engineer at least 10 days prior to the meeting, and no more than 10 days after the Notice to Proceed.
2. The Construction Manager will prepare the agenda, preside at the meeting, and prepare and distribute a transcript of the proceedings to all parties.
3. The Contractor shall provide data required, contribute appropriate items for discussion, and be prepared to discuss all items on the agenda.
4. Required attendance:
    a. Contractor and major subcontractors.
    b. Representatives of the District.
    c. Utility companies and regulatory agencies as necessary
5. The agenda should include, but not necessarily be limited to, the following:
    a. Designation of Responsible Personnel
    b. Subcontractors
    c. Coordination with other Contractors
    d. Processing of Shop Drawings and Distribution of Submittals
    e. Processing of Field Decisions and Change Orders
    f. Requirements of Copies of Contract Documents
    g. Insurance in Force
    h. Processing and Schedule of Payments
    i. Use of Premises
    j. Contractor Responsibility for Safety and First Aid Procedures
    k. Security
    l. Housekeeping
    m. Field Office
    n. Record Drawings
    o. Letter of Notice to Proceed
    p. Other Project Related Items
6. Contractor to provided complete and maintain current
    a. Construction Schedule (CPM)
    b. Schedule of Values

B. Progress Meetings

1. Regular weekly meetings or as agreed upon by the District and Contractor shall be held at a mutually agreed upon location.

2. Minimum Attendance: District representative, Contractor, major subcontractors and major suppliers. Representatives present for each party shall be authorized to act on their behalf.

1.12 LICENSES AND PERMITS

A. Contractor shall be licensed as a General Engineering Contractor in accordance with the provisions of Division 3, Chapter 9, of the Business and Professions Code of the State of California. The Contractor shall possess a State of California "A" license during the time of work.

B. Construction water shall be supplied to the Contractor at no cost, but the construction water will have to be metered. The Contractor may be required to obtain a temporary hydrant meter from the District prior to the start of work.

1.13 DEFINITIONS APPLICABLE TO TECHNICAL SPECIFICATIONS

A. The following words have the meaning defined in the technical portions of the work:

1. Indicated - a word used to direct the Contractor to information contained on the drawings or in the Specifications. Terms such as "shown," "noted," "scheduled," and "specified" also may be used to assist in locating information, but no limitation of location is implied or intended.
2. Furnish - to supply and deliver to the site, to unload and unpack ready for assembly, installation, testing, and startup.
3. Install - defines operations at the site including assembly, erection, placing, anchoring, applying, shaping to dimension, finishing, curing, protecting, and cleaning, ready for the District's use.
4. Provide - defined as furnish and install, ready for the intended use.
5. Installer - a person or firm engaged by the Contractor or its subcontractor or any subcontractor for the performance of installation, erection, or application work at the site. Installers must be expert in the operations they are engaged to perform.

1.14 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Wherever used in these specifications, the following abbreviations will have the meanings listed:

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AISC	American Institute of Steel Construction
ANSI	American National Standards Institute, Inc.
ASCE	American Society of Civil Engineers
ASTM	American Society for Testing and Materials

AWWA	American Water Works Association
BAAQMD	Bay Area Air Quality Management District
CMTC	Caltrans Manual of Traffic Control
CALSPS	Caltrans Standard Plans and Specifications
OSHA	Occupation Safety and Health Act
U.L., Inc.	Underwriter's Laboratories

B. Wherever references are made to published specifications, codes, standards, or other requirements, and where no date is specified, it shall be understood that the latest specifications, standards, or requirements of the respective issuing agencies published as of the date that the work is advertised for bids, shall apply; except to the extent that said standards or requirement s may be in conflict with applicable laws, ordinances, or governing codes. No requirement set forth herein or shown on the Drawings shall be waived because of any provision of, or omission from, said standards or requirement.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.1 GENERAL

A. This Section describes each Contract Bid Item, including the materials, equipment and labor included for payment within each bid item.

B. Contract Bid Items are lump sum prices.

C. This Section defines the process whereby the Schedule of Values (lump sum price breakdown) shall be developed and utilized by the Contractor for preparation of Contractor's Progress Payment Requests.

D. All lump sum price breakdown items shall include all manpower, equipment and material costs such that the total of all items equals The Contract Bid Price.

E. The Contractor shall procure all equipment and appurtenances required as specified and shown in the project drawings and specifications in order to receive full contract payment upon completion.

F. Payment for the various items of the Bid Schedule, as further specified herein, shall include all compensation to be received by the Contractor for furnishing all tools, equipment, supplies, and manufactured articles, and for all labor, operations, and incidentals appurtenant to the items of Work being described, as necessary to complete the various items of the Work in accordance with the requirements of the Contract Documents, including all appurtenances thereto, and including all costs of permits and cost of compliance with the regulations of public agencies having jurisdiction, including Safety and Health Requirements of the California Division of Industrial Safety and the Occupational Safety and Health Administration of the U.S. Department of Labor (OSHA). No separate payment will be made for any item that is not specifically set forth in the Bid Schedule, and all costs therefore shall be included in the prices named in the Bid Schedule for various appurtenant items of Work.

1.2 SCHEDULE OF VALUES

A. The Contractor shall submit a Schedule of Values for the major components of the lump sum bid item for each lift station. Overhead and profit shall not be shown as a separate item and each line item shall include pro-rated amounts for the Contractor's costs, overhead, profit, temporary facilities, and other expenses in connection with the item of work. The total of all items listed in the schedule shall be equal to the Sewer Lift Station Upgrade lump sum bid contract amount. The listing shall include at a minimum the proposed value for the following individual components of the major Work components of the Sewer Lift Station Upgrade bid items:

1. <u>Mechanical and Dry Pit Modifications:</u> Additional demolition and prep work as needed, removal of pipe and fittings, installation of the pre-purchased pump system; furnishing and installing aboveground sanitary sewer piping as necessary, including fittings, pipe

supports, flow meter, check valves, gate valves, air release valve, radar level instrument, and associated piping and appurtenances; performance testing and start-up of these systems, steel rebar reinforcement and shotcrete application to line the wall and floor within existing dry pit, removal and disposal of original hatch, metal components and installation of new access and fixed covers for hatch and general post-construction cleanup of site. Any mobilization and demobilization costs associated with the construction scope are incidental to this item.

2. Electrical, Instrumentation and Controls: Demolition and removal of existing electrical, instrumentation and control equipment as applicable; installation of pre-purchased instrumentation equipment; providing other applicable electrical including cables, conduit, and control equipment; PLC programming and alarm dialer configuration as applicable; connection to the existing generator; start-up and testing of all equipment. Any mobilization and demobilization costs associated with the construction scope are incidental to this item.

B. The Engineer shall review the preliminary Schedule of Values and make any adjustments in the listing of major Work components of the bid item and associated value allocations if, in the opinion of the Engineer, these are necessary to establish fair and reasonable allocation of values for the major Work components. Front end loading will not be permitted. The Engineer may require reallocation of major Work components from items in the above listing if in the opinion of the Engineer such reallocation is necessary. This review and any necessary revisions shall be completed within fifteen (15) days from the date of the Notice of Proceed.

1.3 CHANGES TO SCHEDULE OF VALUES

A. In the event that the Contractor and Engineer agree to make adjustments to the original Schedule of Values because of inequities discovered in the original accepted detailed Schedule of Values, increases and equal decreases to values for activities may be made.

B. Revise schedule to list approved Change Orders with each Application for Payment.

1.4 APPLICATION FOR PAYMENT

A. Submit electronic file in Microsoft Excel and Adobe PDF of each Application for Payment on EJCDC C-620 - Contractor's Application for Payment. Alternative equivalent formats are acceptable with approval of the Engineer.

B. Content and Format: Use Bid Item list and Schedule of Values for listing items in Application for Payment.

C. Submit updated construction schedule with each Application for Payment.

D. Payment Period: Submit at intervals stipulated in the Agreement.

E. Substantiating Data: When Engineer requires substantiating information, submit data justifying dollar amounts in question. Include the following with Application for Payment:

1. Partial release of liens from major Subcontractors and vendors.
2. Affidavits attesting to off-Site stored products.

1.5 CHANGE PROCEDURES

A. Submittals: Submit name of individual authorized to receive change documents, and be responsible for informing others in CONTRACTOR'S employ or Subcontractors of changes to the WORK.

B. The ENGINEER will advise of minor changes in WORK not involving adjustment to Contract Sum/Price or Time by issuing supplemental instructions in writing.

C. The ENGINEER may issue a Proposal Request including a detailed description of proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change with stipulation of overtime work required and the period of time during which the requested price will be considered valid. CONTRACTOR will prepare and submit estimate within 14 days.

D. CONTRACTOR may propose changes by submitting a request for change to ENGINEER, describing proposed change and its full effect on the WORK. Include a statement describing reason for the change, and effect on Contract Sum/Price and Contract Time with full documentation and a statement describing effect on WORK by separate or other Contractors. Document requested substitutions in accordance with Section 01600.

E. Stipulated Sum/Price Change Order: Based on Proposal Request and CONTRACTOR'S fixed price quotation or CONTRACTOR'S request for Change Order as approved by ENGINEER.

F. Unit Price Change Order: For contract unit prices and quantities, the Change Order will be executed on fixed unit price basis. For unit costs or quantities of units of work which are not pre-determined, execute WORK under Work Directive Change.

G. Work Directive Change: ENGINEER may issue a Work Directive. Work Directive Change signed by OWNER, instructing CONTRACTOR to proceed with change in the WORK, for subsequent inclusion in a Change Order. Document will describe changes in the WORK, and designate method of determining any change in Contract Sum/Price or Contract Time. Promptly execute change.

H. Document each quotation for change in cost or time with sufficient data to allow evaluation of quotation.

I. Execution of Change Orders: Engineer will issue Change Orders for signatures of parties as provided in Conditions of the Contract.

J. Correlation Of CONTRACTOR Submittals:
   1. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as separate line item and adjust Contract Sum/Price.
   2. Promptly revise progress schedules to reflect change in Contract Time, revise sub- schedules to adjust times for other items of work affected by the change, and resubmit.
   3. Promptly enter changes in Project Record Documents.

1.6 DEFECT ASSESSMENT

A. Replace the Work, or portions of the Work, not conforming to specified requirements.

B. If, in the opinion of Engineer, it is not practical to remove and replace the Work, Engineer will direct appropriate remedy or adjust payment.

C. The defective Work may remain or will be partially repaired according to instructions of Engineer, but unit sum/price will be adjusted to new sum/price at discretion of Engineer and Owner.

D. Individual specification sections may modify these options or may identify specific formula or percentage sum/price reduction.

E. Authority of Engineer and Owner to assess defects and identify payment adjustments is final.

F. Nonpayment for Rejected Products: Payment will not be made for rejected products for any of the following reasons:
   1. Products wasted or disposed of in a manner that is not acceptable.
   2. Products determined as unacceptable before or after placement.
   3. Products not completely unloaded from transporting vehicle.
   4. Products placed beyond lines and levels of the required Work.
   5. Products remaining on hand after completion of the Work.
   6. Loading, hauling, and disposing of rejected products.

1.7 BID ITEMS

A. The Bid Amounts for each Bid Item will be used for comparative bid analysis. The Bid amounts will also form the basis of monthly progress payments. Each Lump Sum bid amount will undergo further breakdown as described previously in this section. Bid items are not intended to be exclusive descriptions of Work categories and the Contractor shall determine and include in its pricing all materials, labor, and equipment necessary to complete each Bid Item (Work phase) as shown and specified.

B. All pay line items will be paid for at the unit prices named in the Bid Schedule for the respective items of Work. The quantities of work or materials stated as unit price items on the Bid Schedule is supplied only to give an indication of the general scope of the Work.

C. Payment for dewatering, field engineering and all other work required to complete the work in this contract is included in the various items of work. No separate payment will be made for any of these items of work.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01050

FIELD ENGINEERING

PART 1 GENERAL

1.1 GENERAL

A. Vertical and horizontal datum is based on the survey information shown on the Drawings. The Contractor shall establish other control and reference points and make additional surveys as needed for construction, such as but not limited to control lines, slope stakes, batter boards, stakes for pipe locations and other working points, lines, and elevations. All connections shall be installed based on actual elevations of existing structures to which connections are made.

1.2 LINES AND GRADES

A. The Contractor shall lay out all work, including structures and pipelines, and shall be responsible for any errors resulting therefrom. In all questions arising as to proper location of lines and grades, the Construction Manager's decision will be final.

B. As part of the bid price for the construction of improvements, the Contractor shall provide and be responsible for the layout of all work. The Contractor shall provide all necessary surveys, field staking, and positioning for the construction of all components at the proper alignment, elevations, grades, and positions, as indicated on the Drawings and as required for the proper operation and function. The Contractor shall stake its work limits.

C. Survey work shall be performed under the supervision of a California licensed land surveyor or California registered civil engineer whose license permits such work.

D. The Contractor's layout shall be based on existing structures, survey control and bench marks established by the District. Survey work shall be performed under the supervision of a California licensed land surveyor or California registered civil engineer whose license permits such work.

E. The Contractor shall reestablish reference benchmarks and survey control monuments destroyed by his operations at no cost to the District.

F. The Contractor shall supply such labor as required, at no extra charge, to aid and assist the Construction Manager in checking location and grades of work as set by the Contractor if the Construction Manager desires to perform this checking. This shall include moving materials and equipment located between monuments and the construction work.

1.3 RECORDS

A. The Contractor shall keep a record of all measurements and calculations made while surveying the work and shall submit three (3) copies of the records to the Engineer when requested.

1.4 PAYMENT

A. No separate or direct payment will be made for the work covered under this section of the specifications, and all costs in connection therewith will be considered a subsidiary obligation of the Contractor under Base Bid Items.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01300

SHOP DRAWINGS AND SUBMITTALS

PART 1 GENERAL

1.1 DESCRIPTION

A. This Section specifies the general methods and requirements of submissions applicable to the following work-related submittals: Shop Drawings, Product Data, Samples, and Construction or Submittal Schedules. Detailed submittal requirements will be specified in the technical specification section.

1.1 THE REQUIREMENT

A. Wherever submittals are required in the contract documents, all such submittals by the Contractor shall be submitted to the Engineer.

1.2 PRE-CONSTRUCTION MEETING SUBMITTALS

A. At the preconstruction meeting, the Contractor shall submit the following items to the Engineer for review:
   1. A preliminary schedule of shop drawings, samples, and proposed substitute ("Or Equal") submittals listed in the bid.
   2. Schedule of Values.

1.2 SHOP DRAWINGS AND PRODUCT DATA (As applicable)

A. Shop Drawings.
   1. The Contractor is required to prepare and submit Shop Drawing submittals to the Engineer for review and approval. Shop Drawings are required for all materials and equipment proposed to be incorporated into the Work. Shop Drawings shall be submitted by the Contractor in accordance with these specifications. Faxed Shop Drawings are not acceptable.
   2. The data shown on the Shop Drawings shall be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show the materials and equipment the Contractor proposes to provide and to enable the Engineer to review the information for the limited purposes described herein.
   3. As part of each Shop Drawing submittal, the Contractor shall give specific written notice of all deviations that the Shop Drawing or sample submitted may have from the requirements of the Contract Documents. The Contractor shall also provide a notation of each such variation on each Shop Drawing and sample submitted to the Engineer for review and approval.
   4. The Engineer will review the Shop Drawings and samples. The Engineer's review and approval or disapproval will be only to determine if the items covered by the submittals generally comply with the intent of the design. The Engineer's review and approval or disapproval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or

programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

5. The Engineer's review and approval of Shop Drawings or samples shall not relieve the Contractor from responsibility for any variation from the requirements of the Contract Documents. No portion of the Work requiring a Shop Drawing submittal shall be started until the submittal has been reviewed by and returned to the Contractor with a notation indicating that resubmittal is not required.
6. Revisions indicated on shop drawings shall be considered as changes necessary to meet the requirements of the Specifications and shall not be taken as the basis of claims for extra work. The Contractor shall have no claim for damages or extension of time due to any delay resulting from making changes to Shop Drawings that have been requested by the Engineer.
7. The Engineer's review is limited to checking for general conformance with the design intent and general compliance with the information included in the Contract Documents. Any comments included on Shop Drawings are subject to all requirements of the Contract Documents, applicable codes and permits, and do no relieve the Contractor of any project responsibilities and requirements thereof. Approval/Acceptability of a specific item does not imply approval of an assembly of which the item is a component.
8. The Engineer will review the initial submittal of Shop Drawings and sample submission and one resubmittal without cost to the Contractor. The cost of the Engineer's review of multiple resubmittals will be billed to the Contractor at the hourly rate of $145 per hour. Multiple resubmittal costs, as provided to the Owner by the Engineer, will be deducted from any monies due or which become due to the Contractor.
9. The term "Shop Drawings" as used herein shall be understood to include detailed design calculations, shop drawings, fabrication, and installation drawings, manufacturer's instructions, erection drawings, lists, graphs, catalog sheets, product data sheets, and similar items. Whenever the Contractor is required to submit design calculations as part of a submittal, such calculations shall bear the signature and seal of an Engineer registered in the appropriate branch and in the State of California, unless otherwise directed.
10. Normally, a separate transmittal form shall be used for each specific item or class of material or equipment for which a submittal is required. A multiple-page submittal shall be collated into sets, and each set shall be stapled or bound, as appropriate, prior to transmittal to the Engineer.
11. Except as may otherwise be indicated herein, the Engineer will return one copy of each submittal to the Contractor with its comments noted thereon, within fourteen (14) calendar days following their receipt by the Engineer. It is considered reasonable that the Contractor shall make a complete and acceptable submittal to the Engineer by the second submission of a submittal item. The District reserves the right to withhold monies due to the Contractor to cover additional costs of the Engineer's review beyond the second submittal. The Engineer's maximum review period for each submittal, including all resubmittals, will be fourteen (14) calendar days per submittal.
12. No materials shall be delivered to the site without an approved submittal.
13. If one copy of a submittal is returned to the Contractor marked "NO EXCEPTIONS TAKEN," formal revision and resubmission of said submittal will not be required.

14. If one copy of a submittal is returned to the Contractor marked "MAKE CORRECTIONS NOTED," formal revision and resubmission of said submittal will not be required.
15. If a submittal is returned to the Contractor marked "AMEND-RESUBMIT," the Contractor shall revise said submittal and shall resubmit the required number of copies of said revised submittal to the Engineer.
16. If a submittal is returned to the Contractor marked "REJECTED-RESUBMIT," the Contractor shall revise said submittal and shall resubmit the required number of copies of said revised submittal to the Engineer.
17. Fabrication of an item shall commence only after the Engineer has reviewed the pertinent submittals and returned copies to the Contractor marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED." Corrections indicated on submittals shall be considered as changes necessary to meet the requirements of the Contract Documents and shall not be taken as the basis for changes to the contract requirements.
18. All Contractor shop drawings submittals shall be carefully reviewed by an authorized representative of the Contractor, prior to submission to the Engineer. Each submittal shall be dated, signed, and certified by the Contractor, as being correct and in strict conformance with the Contract Documents. In the case of shop drawings, each sheet shall be so dated, signed, and certified. No consideration for review by the Engineer of any Contractor submittals will be made for any items which have not been so certified by the Contractor. All non-certified submittals will be returned to the Contractor without action taken by the Engineer, and any delays caused thereby shall be the responsibility of the Contractor.
19. The Engineer's review of Contractor shop drawings submittals shall not relieve the Contractor of the entire responsibility for the correctness of details and dimensions. The Contractor shall assume all responsibility and risk for any misfits due to any errors in Contractor submittals. The Contractor shall be responsible for the dimensions and the design of adequate connections and details.

B. Product Data: Product data as specified in individual Sections, includes, but is not necessarily limited to, standard prepared data for manufactured products (sometimes referred to as catalogue data), such as the manufacturer's product specifications and installation instructions, availability, roughing-in diagrams and templates, catalog cuts, product photographs, standard wiring diagrams, printed performance curves and operational-range diagrams, production or quality control inspection and test reports and certifications and recommended spare-parts listing, and product warranties, as applicable to the Work. Product data shall be submitted electronically to the maximum extent possible.

1.3 SAMPLES

A. Whenever, in the Specifications, samples are required, the Contractor shall submit not less than 2 samples of each item or material to the Engineer for acceptance at no additional cost to the District.

B. Each sample shall be identified clearly as to material, supplier, pertinent data such as catalog number and the use for which intended.

C. Samples, as required herein, shall be submitted for acceptance a minimum of 14 days prior to ordering such material for delivery to the job site, and shall be submitted in an orderly sequence so that dependent materials or equipment can be assembled and reviewed without causing delays in the Work.

D. All samples shall be individually and indelibly labeled or tagged, indicating thereon all specified physical characteristics and manufacturer's name for identification and submitted to the Engineer for acceptance. Upon receiving acceptance of the Engineer, one (1) set of the samples will be stamped and dated by the Engineer and returned to the Contractor, and one (1) set of samples will be retained by the Engineer, and one (1) set of samples shall remain at the job site until completion of the Work.

E. Unless indicated otherwise, all colors and textures of specified items presented in sample submittals shall be from the manufacturer's standard colors and standard materials, products, or equipment lines. If the samples represent non-standard colors, materials, products, or equipment lines and their selection will require an increase in contract time or price, the Contractor will clearly indicate same on the transmittal page of the submittal.

1.3 EQUIPMENT, MATERIALS AND COMPONENTS

A. Any item which the Contractor proposes to furnish as equal to any item specified shall be submitted for approval in accordance to Section 01600 – Product Requirements.

1.4 REQUIRED SUBMITTALS

A. Construction Schedule. The Contractor shall furnish the Engineer his/her proposed work schedule within 15 days after award of contract. The Contractor shall also advise the Engineer of revisions of the schedule as modifications may become necessary, or as may be required after commencement of work. Such outlines and revisions shall be in sufficient detail to enable the Engineer to judge as to the adequacy of the Contractor's operations and to anticipate such conditions as may tend to impair or retard the progress and completion of the work.

B. Payment Schedule. The Contractor shall furnish the Engineer a detailed payment schedule within 15 days of award of contract. This schedule shall be based upon the Contract Bidding Schedule but with sufficient additional detail to allow accurate calculation of the Monthly Progress Payment. Lump sum bid items shall be broken down into their component parts, i.e., mobilization, pumps, controls, generator, etc. with a cost figure for each.

C. Submittals are required on the items as listed individually in each section of the Technical Specifications. The description of submittal data required is contained in the individual section.

D. The Contractor shall furnish to the Engineer one (1) digital set and two (2) complete bound sets of operation and maintenance instructions for those items as listed individually in each section of the Technical Specifications. Each set shall contain manufacturer's specifications, operation and performance and dimensional data. Sets shall be neatly segregated, indexed and labeled. See also Section 01780 – Operations and Maintenance Data.

1.5 CONTRACTOR'S RESPONSIBILITIES

A. The Contractor shall review shop drawings, product data and samples, including those by Subcontractors, prior to submission to determine and verify the following:
   1. Field construction criteria and requirements.
   2. Field construction criteria.
   3. Catalog numbers and similar data.
   4. Conformance with the Specifications.

B. If a shop drawing shows any deviation from the requirements of the Contract Documents, the Contractor shall provide a description of the deviations with the reason and justification in a letter attached to the submittal.

C. The review and approval of shop drawings, samples or product data by the Engineer shall not relieve the Contractor from his responsibility with regard to the fulfillment of the Contract.

D. No portion of the work requiring a shop drawing, sample, or product data shall be started nor shall any materials be fabricated prior to the approval or qualified approval of such item. Fabrication performed, materials purchased or on-site construction accomplished which does not conform to approved shop drawings and data shall be at the Contractor's risk. The District will not be liable for any expense or delay due to corrections or remedies required to accomplish conformity.

E. Project work, material, and fabrication shall conform with approved shop drawings, applicable samples, and product data.

1.6 SUBMISSION REQUIREMENTS

A. Make submittals promptly in accordance with approved schedule.

B. Deliver submittals electronically in PDF format.

C. All submittals and Requests for Information (RFI) shall be made sufficiently in advance of construction to provide 14 calendar days for review by the Engineer.

D. A single submittal shall be provided by the Contractor for all items contained within a single specification. Submit all product data, shop drawings, laboratory test results, material source information, and certificates of compliance listed in each specification section under a single submittal cover for review. Incomplete submittals will not be reviewed.

E. Number of submittals required: It is the intent of the District to maximize the use of electronic submittals. Submit one electronic copy to the Engineer. If an electronic submittal is not practical submit per the following:
   1. Shop Drawings: Unless otherwise stated in the respective Specifications Sections, submit two hard copies.
   2. Product Data: Unless otherwise stated in the respective Specifications Sections, submit two hard copies.
   3. Samples: Submit two samples unless stated otherwise in the respective Specification Sections.

F. Submittals shall contain:
   1. Cover sheet that includes:
      a. The date of submission and the dates of any previous submissions.
      b. The Project title and number.
      c. Contractor identification.
      d. The names of:
         1) Contractor.
         2) Supplier.
         3) Manufacturer.
      e. Identification of the product, with the specification section number, page, and paragraph(s).
   2. Field dimensions, clearly identified as such.
   3. Relation to adjacent or critical features of the Work or materials.
   4. Applicable standards, such as ASTM numbers.
   5. Identification of deviations from Contract Documents.
   6. Identification of revisions on resubmittals.

1.7 REVIEW OF SHOP DRAWINGS, PRODUCT DATA, WORKING DRAWINGS AND SAMPLES

A. The Engineer's review is for general conformance with the design concepts presented in the Contract Documents. Markings or comments shall not be construed as relieving the Contractor from compliance with the Contract Drawings and Specifications or from departures there from. The Contractor remains responsible for details and accuracy, for coordinating the work with all other associated work and trades, for selecting fabrication processes, for techniques of assembly, and for performing work in a safe manner.

B. The review of shop drawings, data, and samples will be general. They shall not be construed:
   1. As permitting any departure form the Contract requirements:
   2. As relieving the Contractor of responsibility for any errors, including details, dimensions, and materials:
   3. As approving departures from details furnished by the Engineer, except as otherwise provided herein.

C. If the shop drawings, data or samples submitted describe variations and show a departure from the Contract requirements which the Engineer finds to be in the interest of the District and to be so minor as not to involve a change in Contract Price or time for performance, the Engineer may return the reviewed drawings without noting an exception.

D. One electronic copy of shop drawings or product data will be returned to the Contractor. Samples will not be returned. If the Contractor wishes extra copies to be returned, he/she shall submit additional copies.

E. Submittals will be returned to the Contractor under one of the action codes indicated and defined on the transmittal form furnished by the Engineer.

F. Re-submittals will be handled in the same manner as first submittals. On re-submittals, the Contractor shall direct specific attention, in writing, on the letter of transmittal and on re- submitted shop drawings by use of revision triangles or other similar methods, to revisions other than the corrections requested by the Engineer on previous submissions. Any such revisions which are not clearly identified shall be

made at the risk of the Contractor. The Contractor shall make corrections to any work done because of a revision that is not in accordance with the Contract Documents.

G. Partial submittals may not be reviewed. The Engineer will be the only judge as to the completeness of a submittal. Submittals not complete will be returned to the Contractor, and will be considered "Rejected" until re-submitted. The Engineer may at his option provide a list or mark the submittal directing the Contractor to the areas that are incomplete.

H. If the Contractor considers any correction indicated on the shop drawings to constitute a change to the Contract Documents, the Contractor shall give written notice thereof to the Engineer at least five (5) working days prior to release for manufacture.

I. When the shop drawings have been completed to the satisfaction of the Engineer, the Contractor shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the Engineer.

1.8 DISTRIBUTION

A. Distribute reproductions of approved shop drawings and copies of approved product data and samples, where required, to the job site file and elsewhere as directed by the Engineer.

1.9 GENERAL PROCEDURES FOR SUBMITTALS

A. Coordination of Submittal Times: Prepare and transmit each submittal sufficiently in advance of performing the related work or other applicable activities, or within the time specified in the individual work sections of the Specifications, so that the installation will not be delayed by processing times including re-submittal (if required), coordination with other submittals, testing, purchasing, fabrication, delivery and similar sequenced activities. No extension of time will be authorized because of poorly sequenced activities. No extension of time will be authorized because of the Contractor's failure to transmit submittals sufficiently in advance of the Work.

B. All submittals shall be made utilizing an approved submittal cover form which shall be used as the document for approving or disapproving the material. Written approval must be obtained from the Engineer before items requiring submittal are purchased. Submittals not in accordance with the plans and specifications shall be accompanied by a written statement indicating in detail all parts which deviate from the plans and specifications.

C. All submittals shall be made to the Engineer by the Contractor only. Submittals received by the Engineer without the Contractor's signature shall be returned to the Contractor without action.

D. Literature, shop drawings, etc., fully describing the items which the Contractor proposes to purchase shall be submitted in the form of one electronic copy. Material or finish samples shall be submitted in five (5) sets. Items submitted shall be plainly marked to indicate which options, models etc. are proposed.

1.4 RECORD DRAWINGS

A. The Contractor shall keep and maintain at the job site, one (1) record set of drawings. The Contractor shall note all project conditions, locations, configurations, and any other changes or deviations which may vary from the details represented on the original contract drawings, including buried or concealed construction and utility features which are revealed during the course of construction. This notation shall be done clearly with a red-colored pen or pencil. Special attention shall be given to recording the horizontal and vertical location of all buried utilities that differ from the locations indicated, or which were not indicated on the Contract Drawings. Said Record Drawings shall be supplemented by any detailed sketches as necessary or directed to indicate, fully, the Work as actually constructed. The Contractor's Record Drawings of the as-built conditions shall include all revisions made necessary by addenda and change orders and shall be maintained up-to-date during the progress of the Work.

B. Copies of the Record Drawings shall be submitted upon completion of the Work.

C. Record Drawings shall be accessible to the Engineer at all times during the construction period.

D. Final payment will not be made until the Contractor's Record Drawings have been prepared and delivered to the Engineer. Record Drawings shall be in the form of a set of prints with carefully plotted information overlaid in red.

E. The Contractor shall be responsible for the accuracy of the Record Drawings.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

3.1 PAYMENT

A. No separate or direct payment will be made for the work covered under this section of the specifications, and all costs in connection therewith will be considered a subsidiary obligation of the Contractor under Base Bid Items.

END OF SECTION

SECTION 01320

SCHEDULING AND REPORTING

PART 1 GENERAL

1.1 GENERAL

A. The scheduling of the Work under the Contract shall be performed in accordance with the requirements of this Section. The development of the schedule, the cost loading of the schedule, monthly payment requisitions and project status reporting requirements of the Contract shall employ scheduling. The schedule and all reports should be prepared with the latest version of Microsoft Project or the equivalent, latest version. Where submittals are required hereunder, the Contractor shall submit two copies of each submittal item.

B. Work Hours: 7:00 am to 5:00 pm, five days a week. If the Contractor desires to work on Saturdays, Sundays, or legal holidays, or begin a working day prior to 7:00 am, or end a working day after 5:00 pm, the Contractor shall submit a written request to the Engineer for approval. The request shall state the reason for the change in the working day or schedule, and shall be submitted a minimum of five (5) working days prior to the requested change.

The Engineer shall approve or deny the request and advise the Contractor in writing of his decision. If the request is approved, the Contractor may be required to pay the cost of providing inspection services for the work being performed.

C. Work Sequence: The Contractor's schedule must reflect the required special sequence of certain work activities as described in Section 01010 – Summary of Work.

D. Days are defined as calendar days.

1.2 INITIAL SCHEDULE SUBMITTALS

A. The Contractor shall submit two short-term schedule documents at the Preconstruction Conference which shall serve as the Contractor's Plan of Operation for the initial 60-day period of the Contract Time and to identify the manner in which the Contractor intends to complete all Work within the Contract Time. The Contractor shall submit: (1) a 60-day Plan of Operation bar chart, and (2) a project overview bar chart type plan for all Work as indicated below:

1. 60-Day Plan of Operation: During the initial 60 days of the Contract Time, the Contractor shall conduct Contract operations in accordance with the 60-day bar chart Plan of Operation. The bar chart shall show the accomplishment of the Contractor's early activities (mobilization, permits, submittals necessary for early material and equipment procurement, submittals necessary for long-lead equipment procurement, schedule submittals, initial site work and other submittals and activities required in the first 60 days).

2. Project Overview Bar Chart:
   a. The overview bar chart shall indicate the major components of the project Work and the sequence relations between major components and subdivisions of major components. The overview bar chart shall indicate the relationships and time frames in which the various components of the Work will be made substantially complete and placed into service to meet the project milestones. Sufficient detail shall be included for the identification of subdivisions of major components into such activities as:
      (1) demolition and excavation, (2) pumps and piping, (3) electrical work,
      (4) other important work for each major activity within the overall project scope. Planned durations and start dates shall be indicated for each work item subdivision. Each major component and subdivision component shall be accurately plotted on time scale sheets not to exceed 24-inch by 36-inch in size. Not more than four sheets shall be employed to represent this overview information.
   b. The Engineer and the Contractor shall meet to review and discuss the 60-day plan of operations and project overview bar chart within 5 days after they have been submitted to the Engineer. The Engineer's review and comment on the schedules shall be limited to Contract conformance with the sequencing the milestone requirements as stated in other sections of the specifications. The Contractor shall make corrections to the schedules necessary to comply with the Contract requirements and shall adjust the schedules to incorporate any missing information requested by the Engineer.

1.3 SCHEDULE SUBMITTALS

A. Original Schedule Submittal: Within 5 days after the commencement date stated in the Notice to Proceed, the Contractor shall submit for review and approval by the Engineer a hard copy of the Network Schedule and the Computerized Schedule Report tabulations. The Contractor shall also submit a compact disk (CD) that contains all of the schedule submittal information and data. The CD shall contain data compatible with the latest version of "Microsoft Project" to generate network diagrams and schedule reports identical to the hard copies submitted. This submittal shall have already been reviewed and approved by the Contractor's Project Manager prior to submission. The Schedule shall be a time-scaled network diagram of the "I-j" activity-on-arrow or precedence type. The Network Diagram shall describe the activities to be accomplished and their logical relationships and show the Critical Path. The schedule shall contain sufficient detail and information to cost load the Schedule in accordance with the approved schedule of values as specified under Section 01025 – Measurement and Payment.
   1. Report of activities sorted by Activity Number.
   2. Report of activities sorted by Early State date.
   3. Report of activities sorted by Total Float.

B. Original Schedule Review Meeting: The Contractor shall, within 10 days from the commencement date stated in the Notice to Proceed, meet with the Engineer to review the original schedule submittal. The Contractor shall have the Project Manager, Project Superintendent, and the Project Scheduler in attendance. The

Engineer's review will be limited to the submittal's conformance to the Contract requirements. However, the review may also include:

1. Clarifications of the design intent, process, and startup requirements.
2. Directions to include activities and information missing from the submittal.
3. Requests to the Contractor to clarify the schedule.

C. Revisions to the Original Schedule: Within 15 days after the commencement date stated in the Notice to Proceed, the Contractor shall have revised the original schedule submittal to address all review comments from the original schedule review meeting and resubmit the network diagrams and reports for the Engineer's review. The Engineer, within 7 days from the date that the Contractor submitted the revised schedule will either: (1) accept the schedule and cost loaded activities as submitted, or (2) advise the Contractor in writing to review any part or parts of the schedule which either do not meet the Contract requirements or are unsatisfactory for the Engineer to monitor the project's progress and status or evaluate monthly payment requests by the Contractor. The Engineer may accept the schedule with conditions that the first monthly schedule update be revised to correct deficiencies identified. When the schedule is accepted, it shall be considered as the "Original Construction Schedule" until an updated schedule has been submitted. The District reserves the right to require that the Contractor adjust, add to, or clarify any portion of the schedule which may later be discovered to be insufficient for the monitoring of the Work or approval of partial payment requests. No additional compensation will be provided for such adjustments, additions or clarifications.

D. Acceptance:

1. The acceptance of the Contractor's schedule by the Engineer and District will be based solely upon the schedule's compliance with the Contract requirements. By way of the Contractor assigning activity durations and proposing the sequence of the Work, the Contractor agrees to utilize sufficient and necessary management and other resources to perform the Work in accordance with the schedule. Upon submittal of a schedule update, the updated schedule shall be considered the "current" project schedule.
2. Submission of the Contractor's progress schedule to the District or Engineer shall not relieve the Contractor of the contractor's total responsibility for scheduling, sequencing, and pursuing the Work to comply with the requirements of the Contract Documents, including adverse effects such as delays resulting from ill- timed work.

E. Monthly Updates and Periodic Schedule Submittals:

1. Following the acceptance of the Contractor's Original Construction Schedule, the Contractor shall monitor the progress of the Work and adjust the schedule each month to reflect actual progress and any changes in planned future activities. Each schedule update submitted must be completed including all information requested in the original schedule submittal. Each update shall continue to show all work activities including those already completed. These completed activities shall accurately reflect the "as built" information by indicating when the work was actually started and completed.
2. Neither the submission nor the updating of the Contractor's original schedule submittal nor the submission, updating, change or revision of any

other report, curve, schedule or narrative submitted to the Engineer by the Contractor under this Contract, nor the Engineer's review of acceptance of any such report, curve, schedule or narrative shall have the effect of amending or modifying, in any way, the Contract completion date or milestone dates or of modifying or limiting, in any way, the Contractor's obligations under this Contract. Only a signed, fully executed change order can modify these contractual obligations.

3. The monthly schedule update submittal will be reviewed with the Contractor during a monthly construction progress meeting held on a month end date to be determined. The goal of these meetings is to enable the contractor and the Engineer to initiate appropriate remedial action to minimize any known or foreseen delay in completion of the Work and to determine the amount of Work completed since the last month's schedule update. The status of the Work will be determined by the percent complete of each activity shown in the Network Diagram. These meetings are considered a critical component of the overall monthly schedule update submittal and the Contractor shall have appropriate personnel attend. As a minimum, these meetings shall be attended by the Contractor's Project Manager and General Superintendent. Within seven (7) calendar days after the monthly progress meeting, the Contractor shall submit the revised Network Diagram, the revised computerized tabulations as noted in this Section.

F. Schedule Revisions: The Contractor shall highlight or otherwise identify all changes to the Network Diagram Schedule Logic or activity durations made from the previous schedule. The Contractor shall modify any portions of the schedule which become infeasible because of activities behind schedule or for any other valid reason.

1.4 CHANGE ORDERS

A. Upon approval of a change order, or upon receipt by the Contractor of authorization to proceed with additional work, the change shall be reflected in the next submittal of the schedule by the Contractor. The Contractor shall utilize a sub-network in the schedule depicting the changed work and its effect on other activities.

1.5 SCHEDULE REPORTS (FORMAT)

A. Schedule Reports: Schedule Reports shall be prepared based on the Construction Schedule, and shall include the following minimum data for each activity:

1. Activity Numbers and Responsibility Codes.
2. Contract Number.
3. Estimated Activity Duration.
4. Activity Description.
5. Activity's Percent Completion.
6. Early Start Date (Calendar Dated).
7. Early Finish Date (Calendar Dated).
8. Late Start Date (Calendar Dated).
9. Late Finish Date (Calendar Dated).
10. Status (Whether Critical).
11. Total Float for Each Activity.
12. Free Float for Each Activity.
13. Cost Value for Each Activity.

B. Project Information: Each Schedule Report shall be prefaced with the following summary data:
   1. Project Name.
   2. Contractor.
   3. Contract Number.
   4. Type of Tabulation.
   5. Project Duration.
   6. Contract Completion Date (revised to reflect time extensions).
   7. The Commencement Date Stated in the Notice to Proceed.
   8. The Data Date and Plot Date of the Network Diagram.
   9. If any update, the new schedule completion date.

1.6 INCLEMENT WEATHER PROVISIONS OF THE SCHEDULE

A. The Contractor's construction schedule shall include lost days on the schedule's critical path due to inclement weather typical for the area of construction based on the average rain days for the past 5 years.

PART 2 MATERIALS (NOT USED)

PART 3 EXECUTION

3.1 PAYMENT

A. No separate or direct payment will be made for the work covered under this section of the specifications, and all costs in connection therewith will be considered a subsidiary obligation of the Contractor under Base Bid Items.

END OF SECTION

SECTION 01400

QUALITY CONTROL

PART 1 GENERAL

1.1 PERFORMANCE OF WORK BY CONTRACTOR

A. The Contractor's procedure and methods of construction may, in general, be of his/her own choosing, provided they follow best general practice and are calculated to secure results which will satisfy the requirements of these specifications.

B. The Contractor shall furnish the Engineer all reasonable facilities for obtaining such information as he may desire respecting the character of the materials and the progress of the work. The Contractor shall furnish information to include the number of persons employed, their pay, the time they worked, and other elements of cost at the request of the Engineer or the Engineer.

1.2 AUTHORITY OF THE ENGINEER

A. The authority of the Engineer for technical contract administration and inspection of the work is limited to the following functions:
   1. Inspect and accept or reject work and materials including exceptions to material submittals and shop drawings.
   2. Assure compliance with all technical contract terms and conditions.
   3. Clarify specifications and drawings where clarification does not involve contract cost or time. Any disagreements with the Contractor over clarification of specifications and drawings are to be immediately referred to the District.
   4. Verify, prepare, and recommend payment estimates on progress payments; forward to the District for approval.
   5. All known or suspected violations of the Labor Standards Provisions shall be reported immediately to the District.
   6. Enforce safety requirements in accordance with the Federal and State Regulations and the Technical Specifications.

B. The Engineer is not authorized to take the following actions:
   1. Make changes to the contract provisions, period of performance, or change any contract terms or conditions.
   2. Make decisions concerning any claims and disputes under this contract.

C. Close liaison will be maintained by the Engineer, the District and the Contractor. The Engineer shall notify the District immediately of any problems encountered, including but not restricted to maintaining completion schedules.

1.3 AUTHORITY OF THE INSPECTOR

A. An Inspector employed by the District will assist the Engineer in making inspections and measurements and will enforce strict compliance with the terms of the contract.

B. The Inspector shall have free access to the job site at all times while construction is in progress, and the Contractor shall furnish such information and assistance as may be necessary.

C. The Inspector shall, on a daily basis, record the work being accomplished, the trades working, materials delivered and/or installed, reasons for delays, and other pertinent information.

D. The Inspector may reject unsuitable materials or work not performed in accordance with the terms of the contract until the situation has been referred to and resolved by the Engineer and/or District.

E. The Inspector shall observe that all construction is performed in conformance with the contract health and safety requirements.

F. The Inspector shall conduct wage rate interviews and report suspected labor standard violations to the District.

G. The Inspector shall check and verify the Contractor's progress payment requests, if progress payments have been included in the contract.

H. No decisions or instructions of an Inspector will at any time relieve the Contractor from the responsibility of complying fully with all the requirements of the contract. In cases of differences arising between an Inspector and the Contractor or his agent, appeal shall be taken to the Engineer.

I. Inspectors are not authorized to waive or alter in any respect any of the terms or requirements of the contract, to make additional requirements, to grant extensions of time or delays, or to waive forfeitures. The Contractor shall not be entitled to payment for any work improperly performed with or without an Inspector's approval.

1.4 INSPECTION AND TESTING

A. Contract Description.
1. Where the Contract Documents require work to be field tested or approved, it shall be tested in the presence of the Engineer or its authorized representative. The Engineer shall have the right to witness all on-site tests performed by the Contractor and any shop tests. The results of any tests performed by the Contractor shall be made available for the information of the Engineer. Inspections, tests or favorable reviews by the Engineer or others shall not relieve the Contractor from its obligation to perform the work in accordance with the requirements of the Contract Documents or for its sole responsibility for the quality of workmanship and materials.
2. Except as specifically required under the technical specifications for testing and inspection, all tests for materials furnished by the Contractor will be done in accordance with commonly recognized standards of national organizations. Where tests are to be performed by an independent laboratory or agency, the Contractor shall furnish such samples of all materials as required by the Engineer without charge. The sample or samples of materials to be tested shall be selected by such laboratory or agency, or the Engineer, and not by the Contractor. No material for

which the Contract Documents require the submittal and approval of tests, certificates of compliance or other documentation shall be incorporated in the Work until such submittal has been made and approved.

3. The Contractor shall provide safe access for the Engineer and inspectors to adequately inspect the quality of work and the conformance with the Contract Documents. The Contractor shall furnish the Engineer the necessary labor and facilities for such things as excavation in the compacted fill to the depths required to take samples. The Contractor shall provide adequate lighting, ventilation, ladders and other protective facilities as may be necessary for the safe performance of inspections.
4. Upon completion of the Work the Engineer will conduct a final inspection as provided for in Section 01700 – Project Closeout. Records shall be available at all reasonable hours for inspection by other local or State agencies to ascertain compliance with laws and regulations.

B. Notice
1. The Contractor shall notify the Engineer in writing at least 72 hours before any field testing or special inspections, including concrete and compaction testing, are required to be performed by the independent laboratory. Any offsite test will require more intense planning and scheduling.
2. Whenever the Contractor varies the period during which work is carried on each day, the Contractor shall give due notice to the Engineer so that proper inspection may be provided. Any work done in the absence of the Engineer shall be considered to be rejected. It will be the responsibility of the Contractor to demonstrate to the satisfaction of the Engineer that the work meets all conditions of the specification and if such conditions are not met to remove the work.
3. The Contractor shall give the Engineer written notification at least 30 days prior to the shipment of materials and equipment to be tested and/or inspected at the point of origin. Satisfactory tests and inspections at the point of origin shall not be construed as a final acceptance of the materials and equipment nor shall such tests and inspections preclude retesting or re-inspection at the site of the Work.

C. Testing
1. The Engineer shall have the authority to require additional tests or inspections due to the manner in which the Contractor executes its work. Examples of such additional tests and inspections include; tests of materials substituted for previously accepted materials, or substituted for specified materials, or retests made necessary by failure of material to comply with the requirements of the Specifications. The Contractor shall be responsible for the costs of any additional tests or inspections.
2. The Contractor shall submit information and certifications for any independent testing laboratory or agency to the Engineer for review and approval of the labs or agency.

D. Work Covered Prior to Inspection and/or Testing
1. Work requiring inspection and/or testing shall not be concealed or buried prior to the acceptance of such inspection or testing. Work covered without the favorable review or consent of the Engineer shall, if required by the Engineer, be uncovered for inspection and/or testing at the Contractor's expense.

E. Work Covered With Prior Inspection and/or Testing
1. If the Engineer considers it necessary or advisable that covered work which was favorably inspected and tested be uncovered for re-inspection and/or retesting, the

Contractor, at the Engineer's request, will uncover, expose or otherwise make available for observation, inspection or testing as the Engineer may require, that portion of the work in question, furnishing all necessary labor, materials, tools, and equipment. If it is found that such work is defective, the Contractor will bear all expenses of such uncovering, exposure, observation, inspection and testing and of satisfactory reconstruction. If, however, such work is not found to be defective the Contractor will be allowed an increase in the Contract price or an extension of the Contract time, or both, directly attributable to such uncovering, exposure, observation, testing and reconstruction, and a Change Order shall be issued for such additional work.

F. Coordination of State of California and other Inspections

1. The Contractor is completely responsible for scheduling all State, County, and any other agency inspections such as Pacific Gas and Electric Company in accordance with the State, County, and agency requirements. The Contractor shall notify the Engineer of all work component inspection notices and schedules. Failure of the Contractor to properly coordinate and schedule these inspections shall not be cause for time extensions.

PART 2 PRODUCTS

2.1 TEST WATER

A. The Contractor shall coordinate with the District for the use of water available at the project site. The Contractor shall properly dispose of the water, which is required for testing of piping and structures. The Contractor shall dispose of all testing water in the sanitary sewer without damage to property, and in accordance with applicable regulations.

PART 3 EXECUTION – Not Used

END OF SECTION

SECTION 01500

TEMPORARY CONSTRUCTION FACILITIES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:
   1. Furnishing, maintaining, and removing construction facilities and temporary controls, including temporary utilities, construction aids, barriers and enclosures, security, access roads, temporary controls, project sign, field offices and sheds, and removal after construction.

B. Related Sections:
   1. Section 01010 – Summary of Work.

1.2 TEMPORARY UTILITIES

A. Temporary Electrical Power:
   1. Arrange with local utility to provide adequate temporary electrical service if required.
   2. Provide and maintain adequate jobsite power distribution facilities conforming to applicable Laws and Regulations.
   3. Provide, maintain, and pay for electric power for performance of the work except for power required for the final 7-day operational test.
      a. When using permanent facilities, provide separate meter and reimburse Owner for power used in connection with performance of the Work.

B. Temporary Electrical Lighting:
   1. In work areas, provide temporary lighting sufficient to maintain lighting levels during working hours not less than lighting levels required by OSHA and State agency which administers OSHA regulations where Project is located.
   2. When available, permanent lighting facilities may be used in lieu of temporary facilities.
      a. Prior to Substantial Completion of the Work, replace bulbs, lamps, or tubes used by Contractor for lighting.

C. Temporary Heating, Cooling, and Ventilating:
   1. Heat and ventilate work areas to protect the Work from damage by freezing, high temperatures, weather, and to provide safe environment for workers.
   2. Permanent heating system may be utilized when sufficiently completed to allow safe operation.

D. Temporary Water:
   1. Contractor to pay for all water use related to the Work. The Contractor shall provide temporary connections, piping and valving. The Contractor shall not make connection to any water system without first obtaining permission from the District.

2. Contractor shall provide temporary facilities and piping required to bring water to the point of use, and remove them when no longer needed. The District will install a metering device. The Contractor will pay for water used based on meter readings.

3. Contractor shall provide and bear costs of necessary water required for testing equipment, pumps and piping prior to Substantial Completion.

E. Temporary Sanitary Facilities:
1. Provide suitable and adequate sanitary facilities that are in compliance with applicable Laws and Regulations.
2. At completion of the Work, remove sanitary facilities and leave site in neat and sanitary condition.

F. First Aid: Post first aid facilities and information posters conforming to requirements of OSHA and other applicable Laws and Regulations in readily accessible locations.

G. Fire Protection: Furnish and maintain on the site adequate firefighting equipment capable of extinguishing incipient fires. Comply with applicable parts of the National Fire Prevention Standard for Safeguarding Building Construction Operations (NFPA No. 241).

1.3 CONSTRUCTION AIDS

A. Provide railings, kick plates, enclosures, safety devices, and controls required by Laws and Regulations and as required for adequate protection of life and property.

B. Use construction hoists, elevators, scaffolds, stages, shoring, and similar temporary facilities of ample size and capacity to adequately support and move loads.

C. Design temporary supports with adequate safety factor to assure adequate load bearing capability.
1. When requested, submit design calculations by professional registered engineer prior to application of loads.
2. Submitted design calculations are for information and record purposes only.

D. Accident Prevention:
1. Exercise precautions throughout construction for protection of persons and property.
2. Observe safety provisions of applicable Laws and Regulations.
3. Guard machinery and equipment, and eliminate other hazards.
4. Make reports required by authorities having jurisdiction, and permit safety inspections of the Work.
5. Before commencing construction Work, take necessary action to comply with provisions for safety and accident prevention.

E. Barricades:
1. Place barriers at ends of excavations and along excavations to warn pedestrian and vehicular traffic of excavations.

2. Provide barriers with flashing lights after dark.
3. Keep barriers in place until excavations are entirely backfilled and compacted.
4. Barricade excavations to prevent persons from entering excavated areas in streets, roadways, parking lots, treatment plants, or other public or private areas.

F. Warning Devices and Barricades: Adequately identify and guard hazardous areas and conditions by visual warning devices and, where necessary, physical barriers.
1. Devices shall conform to minimum requirements of OSHA and State agency which administers OSHA regulations where Project is located.

G. Hazards in Public Right-of-Way:

1. Mark at reasonable intervals, trenches and other continuous excavations in public right-of-way, running parallel to general flow of traffic, with traffic cones, barricades, or other suitable visual markers during daylight hours.
   a. During hours of darkness, provide markers with torches, flashers, or other adequate lights.
2. At intersections or for pits and similar excavations, where traffic may reasonably be expected to approach head on, protect excavations by continuous barricades.
   a. During hours of darkness, provide warning lights at close intervals.

H. Hazards in Protected Areas: Mark or guard excavations in areas from which public is excluded, in manner appropriate for hazard.

I. Above Grade Protection: On multi-level structures, provide safety protection that meets requirements of OSHA and State agency which administers OSHA regulations where Project is located.

J. Protect existing structures, trees, shrubs, and other items to be preserved on Project site from injury, damage or destruction by vehicles, equipment, worker or other agents with substantial barricades or other devices commensurate with hazards.

K. Fences:
1. Enclose site of the Work including temporary construction staging areas with fence adequate to protect the Work against acts of theft, violence and vandalism.
2. Enclose temporary offices and storage areas with fence adequate to protect temporary facilities against acts of theft, violence and vandalism.
3. Protect temporary and permanent openings and close openings in existing fences to prevent intrusion by unauthorized persons. Bear responsibility for protection of plant and material on site of the work when openings in existing fences are not closed.
4. During night hours, weekends, holidays, and other times when no work is performed at site, provide temporary closures or enlist services of security guards to protect temporary openings.
5. Fence temporary openings when openings are no longer necessary.

6. Fence Material and Installation:
   a. Temporary fencing shall be minimum 6 feet - 0 inches high, shall be constructed of chain-link mesh with vertical and horizontal supports as required for sturdy barrier.
   b. Gates in temporary fencing shall be as required for Contractor's access and facility use. All gates shall be lockable with padlocks, padlocks to be furnished by Contractor for his gates. Furnish one key to Engineer for Contractor's padlocks. Facility use gates shall be hinged and of construction which will not cause liability problems for the District and as approved
   c. Provide fencing within the site, as required, with posts set in compacted earth/gravel mixture.

1.4 SECURITY

A. Make adequate provision for protection of the Work area against fire, theft, and vandalism, and for protection of public against exposure to injury.

1.5 ACCESS ROADS

A. General:
   1. Access to the site shall be via Steele Canyon Road.
   2. The road is a public road and needs to be accessible at all times.
   3. Maintain road free of mud and debris. Under no circumstances shall vehicles leaving the site track mud off the site onto the public right-of-way.

1.6 TEMPORARY CONTROLS

A. Dust Control:
   1. Prevent dust nuisance caused by operations, unpaved roads, excavation, backfilling, demolition, or other activities.
   2. Control dust by sprinkling with water, use of dust palliatives, modification of operations, or other means acceptable to agencies having jurisdiction.

B. Noise Control:
   1. In inhabited areas, particularly residential, perform operations in manner to minimize noise.

C. Mud Control:
   1. Prevent mud nuisance caused by construction operations, unpaved roads, excavation, backfilling, demolition, or other activities.

1.7 FIELD OFFICES AND SHEDS

A. Contractor's Field Office:
   1. Maintain on Project site weather-tight space in which to keep copies of Contract Documents, progress schedule, shop drawings, and other relevant documents.

2. Provide field office with adequate space to examine documents, and provide lighting and telephone service with fax capability in that space.
3. Provide space for desk and chair for use by Engineer.

1.8 REMOVAL

A. Remove temporary buildings and furnishings before inspection for final acceptance or when directed.

B. Clean and repair damage caused by installation or use of temporary facilities.

C. Remove underground installations to minimum depth of 24 inches and grade to match surrounding conditions.

D. Restore existing facilities used during construction to specified or original condition.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 PAYMENT

A. No separate or direct payment will be made for the work covered under this section of the specifications, and all costs in connection therewith will be considered a subsidiary obligation of the Contractor under Base Bid Item #1.

END OF SECTION

SECTION 01530

PROTECTION OF EXISTING FACILITIES

PART 1 GENERAL

1.1 GENERAL

A. The Contractor shall protect all existing facilities, utilities and improvements not designated for removal, and shall restore damaged or temporarily relocated utilities and improvements to a condition equal to or better than they were prior to such damage or temporary relocation, all in accordance with requirements of the Contract Documents.

B. The approximate location of existing utilities is shown in the Drawings. The Contractor shall verify the location and depth of existing utilities at least 7 days prior to beginning excavation. The Contractor shall notify Underground Services Alert (USA) at (800) 642- 2444 who will notify the Dsitrict. The Contractor shall notify the Engineer of any utilities not shown in the Drawings. The Contractor shall make exploratory excavations of all utilities not shown in the Drawings that may interfere with the Work. All such exploratory excavations shall be performed as soon as practicable after award of the Contract and, in any event, a sufficient time in advance of construction to avoid possible delays to the Contractor's work.

1.2 RIGHTS-OF-WAY

A. The Contractor shall not do any work that would affect any oil, gas, sewer, storm or water pipeline; any telephone, telegraph, or electric transmission line; any fence; or any other structure, nor shall the Contractor enter upon the rights-of-way involved until notified by the Engineer that the District has secured authority from the proper party. After authority has been obtained, the Contractor shall give said party due notice to its intention to begin work, if required by said party, and shall remove, shore, support or otherwise protect such pipeline, transmission line, ditch, fence, or structure or replace the same.

1.3 EXISTING UTILITIES AND IMPROVEMENTS

A. General. The Contractor shall protect all underground utilities and other improvements which may be impaired during construction operations. It shall be the Contractor's responsibility to ascertain the actual location of all existing utilities and other improvements that will be encountered in its construction operations, and to see that such utilities or other improvements are adequately protected from damage due to such operations. The Contractor shall take all possible precautions for the protection of unforeseen utility lines to provide for uninterrupted service and to provide such special protection as may be necessary.

B. Utilities to be Moved. In case it shall be necessary to move the property of any public utility or franchise holder, such utility company or franchise holder will, upon request of the Contractor, be notified by the District to move such property within a specified reasonable time. When utility lines that are to be removed are encountered within the area of operations, the Contractor shall notify the

Engineer a sufficient time in advance for the necessary measures to be taken to prevent interruption of service.

C. Where the proper completion of the work requires the temporary or permanent removal and/or relocation of an existing utility or other improvement which is indicated, the Contractor shall remove and, without unnecessary delay, temporarily replace or relocate such utility or improvement in a manner satisfactory to the Engineer and the owner of the facility. In all cases of such temporary removal or relocation, restoration to former location shall be accomplished by the Contractor in a manner that will restore or replace the utility or improvement as nearly as possible to its former locations and to as good or better condition than found prior to removal.

D. District's Right of Access. The right is reserved to the District and to the owners of public utilities and franchises to enter at any time upon any public street, alley, right-of-way, or easement for the purpose of making changes in their property made necessary by the work of this contract.

E. Underground Utilities Indicated. Existing utility lines that are indicated or the locations of which are made known to the Contractor prior to excavation and that are to be retained, and all utility lines that are constructed during excavation operations shall be protected from damage during excavation and backfilling and, if damaged, shall be immediately repaired or replaced by the Contractor.

F. Underground Utilities not Indicated. In the event that the Contractor damages any existing utility lines that are not indicated or the locations of which are not made known to the Contractor prior to excavation, a written report thereof shall be made by the Contractor under the provisions for changes and extra work.

G. All costs of locating, repairing damage not due to failure of the Contractor to exercise reasonable care, and removing or relocating such utility facilities not shown in the Contract Documents with reasonable accuracy, and for equipment on the project which was actually working on that portion of the work which was interrupted or idled during such work will be paid for as extra work.

H. Approval of Repairs. All repairs to a damaged utility or improvement are subject to inspection and approval by an authorized representative of the utility or improvement owner before being concealed by backfill or other work.

I. Maintaining in Service. All oil and gasoline pipelines, power, and telephone or the communication cable ducts, gas and water mains, irrigation lines, sewer lines, storm drain lines, poles, and overhead power and communication wires and cables encountered along the line of the work shall remain continuously in service during all the operations under the Contract, unless other arrangements satisfactory to the Engineer are made with the owner of said pipelines, duct, main, irrigation line, sewer, storm drain, pole, or wire or cable. The Contractor shall be responsible for and shall repair all damage due to its operations, and the provisions of this Section shall not be abated even in the event such damage occurs after backfilling or is not discovered until after completion of the backfilling.

1.4 SUBMITTAL

A. The Contractor shall submit a plan acknowledging depth and location of the existing utilities and a proposed plan for the protection of said utilities during construction. The plan shall be submitted to the District for review prior to start of construction

1.5 NOTIFICATION BY THE CONTRACTOR

A. Prior to any excavation in the vicinity of any existing underground facilities, including all water, sewer, storm drain, gas, petroleum products, or other pipelines; all buried electric power, communications, or television cables; all traffic signal and street lighting facilities; and all roadway and state highway rights-of-way the Contractor shall notify the respective authorities representing the owners or agencies responsible for such facilities not less than 3 days nor more than 7 days prior to excavation so that a representative of said owners or agencies can be present during such work if they so desire.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 PAYMENT

A. No separate or direct payment will be made for the work covered under this section of the specifications, and all costs in connection therewith will be considered a subsidiary obligation of the Contractor under Base Bid Items.

END OF SECTION

SECTION 01550

SITE ACCESS AND STORAGE

PART 1 GENERAL

1.1 HIGHWAY LIMITATIONS

A. The Contractor shall make its own investigation of the condition of available public and private roads and of clearances, restrictions, bridge load limits, and other limitations affecting transportation and ingress and egress to the site of the Work.

B. Oversize and overweight permits are required within the District.

1.2 CROSSINGS

A. General. Continuous, unobstructed, safe, and adequate pedestrian and vehicular access shall be provided to fire hydrants, commercial and industrial establishments, churches, schools, parking lots, service stations, motels, fire and police stations, and hospitals. Safe and adequate public transportation stops and pedestrian crossings at intervals not exceeding 300 feet shall be provided. The Contractor shall cooperate with parties involved in the delivery of mail and removal of trash and garbage so as to maintain existing schedules for such services. Vehicular access to residential driveways shall be maintained to the property line except when necessary construction precludes such access for reasonable periods of time.

B. Street Use. 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 it 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. No street shall be closed to the public without first obtaining permission of the Engineer and proper governmental authority. Where excavation is being performed in primary streets or highways, one lane in each direction shall be kept open to traffic at all times unless otherwise indicated. Toe boards shall be provided to retain excavated material if required by the Engineer or the agency having jurisdiction over the street or highway. Fire hydrants on or adjacent to the Work shall be kept accessible to fire fighting equipment at all times. Temporary provisions shall be made by the Contractor to assure the use of sidewalks and the proper functioning of all gutters, storm drain inlets, and other drainage facilities. No materials shall be stored within the street right-of-way.

1.3 CONTRACTOR'S WORK AND STORAGE AREA

A. Construction staging areas can be located at the site of Lift Station No.2 on Steele Canyon Road, or the District's Wastewater facility at 1465 Steele Canyon Road, Napa, CA 94558. The contractor shall return the temporary construction lay-down areas to the existing condition prior to the end of the project. The Contractor shall make its own arrangements for any necessary off-site storage or shop areas necessary for the proper execution of the Work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 PAYMENT

A. No separate or direct payment will be made for the work covered under this section of the specifications, and all costs in connection therewith will be considered a subsidiary obligation of the Contractor under Base Bid Item #1.

END OF SECTION

SECTION 01600

PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Products.

B. Product delivery requirements.

C. Product storage and handling requirements.

D. Product options.

E. Product substitution procedures.

1.2 DEFINITIONS

A. The word "Products" as used herein is defined to include purchased items for incorporation into the Work, regardless of whether specifically purchased for the project or taken from Contractor's stock of previously purchased products. The word "Materials" is defined as products which must be substantially cut, shaped, worked, mixed, finished, refined, or otherwise fabricated, processed, installed, or applied to form units of work. The word "Equipment" is defined as products with operational parts, regardless of whether motorized or manually operated, and particularly including products with service connections (wiring, piping, and other like items). Definitions in this paragraph are not intended to negate the meaning of other terms used in the Contract Documents, including "specialties," "systems," "structure," "finishes," "accessories," "furnishing," "special construction," and similar terms, which are self- explanatory and have recognized meanings in the construction industry.

B. Neither "Products," "Materials," nor "Equipment" includes machinery and equipment used for preparation, fabrication, conveying and erection of the Work.

1.3 PRODUCTS

A. Furnish products of qualified manufacturers suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise.

B. Do not use materials and equipment removed from existing premises, except as specifically permitted by Contract Documents.

C. Furnish interchangeable components from same manufacturer for components being replaced.

1.4 PRODUCT DELIVERY REQUIREMENTS

A. Schedule delivery of products or equipment as required to allow timely delivery and to avoid prolonged storage.

B. Transport and handle products in accordance with manufacturer's instructions.

C. Deliver products or equipment in manufacture's original unbroken cartons or other containers designed and constructed to protect the contents from physical or environmental damage.

D. Promptly inspect shipments to ensure products comply with requirements, quantities are correct, and products are undamaged.

E. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

F. Clearly and fully mark and identify as to manufacturer, item and installation location.

1.5 PRODUCT STORAGE AND HANDLING REQUIREMENTS

A. Store and protect products in accordance with manufacturers' instructions. Provide manufacturer's instructions for storage and handling.

B. Store with seals and labels intact and legible.

C. For exterior storage of fabricated products, place on sloped supports above ground.

D. Store loose granular materials on solid flat surfaces in well-drained area. Prevent mixing with foreign matter.

E. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

F. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

1.6 STORAGE FACILITIES

A. All equipment and materials procured under this Contract shall be stored at the site of Lift Station No.2 on Steele Canyon Road, or the District's Wastewater facility at 1465 Steele Canyon Road, Napa, CA 94558.

1.7 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Products of one of manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with Provision for Substitutions: Submit request for substitution for any manufacturer not named in accordance with the following article.

1.8 PRODUCT SUBSTITUTION PROCEDURES

A. Engineer will consider requests for Substitutions only within 30 days after date of Owner- Contractor Agreement.

B. Substitutions may be considered when a product becomes unavailable through no fault of Contractor.

C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

D. Whenever materials or equipment are indicated in the Contract Documents by using the name of a proprietary item or the name of a particular supplier, the naming of the item is intended to establish the type, function, and quality required. If the name is followed by the words "or equal" indicating that a substitution is permitted, materials or equipment of other suppliers may be accepted if sufficient information is submitted by the Contractor to allow the Engineer to determine that the material or equipment proposed is equivalent or equal to that named, subject to the following requirements:
   1. The burden of proof as to the type, function, and quality of any such substitute product, material or equipment shall be upon the Contractor.
   2. The Engineer will be the sole judge as to the type, function, and quality of any such substitute and the Engineer's decision shall be final.
   3. The Engineer may require the Contractor to furnish, at the Contractor's expense, additional data about the proposed substitute.
   4. The District may require the Contractor to furnish, at the Contractor's expense, a special performance guarantee or other surety with respect to any substitute.
   5. Acceptance by the Engineer of a substitute item proposed by the Contractor shall not relieve the Contractor of the responsibility for full compliance with the Contract Documents and for adequacy of the substitute.
   6. The Contractor shall be responsible for resultant changes, including design and construction changes, and all additional costs resulting from the changes which the accepted substitution requires in the Contractor's work, the Work of its subcontractors and of other contractors, and shall effect such changes without cost to the District.
   7. If the Contractor wishes to provide a substitute item, the Contractor shall make written application to the Engineer. Unless otherwise provided by law or authorized in writing by the Engineer, the substitution request shall be submitted within the 35-day period after award of the Contract.
   8. Wherever a proposed substitute item has not been submitted within said 35-day period, or wherever the submission of a proposed substitute material or equipment has been judged to be unacceptable by the Engineer, the Contractor shall provide the material or equipment indicated in the Contract Documents.
   9. The Contractor shall certify that the proposed substitute will perform adequately the functions and achieve the results called for by the general design, and be similar and of equal substance to that indicated, and be suited to the same use as that specified.

10. The Engineer will evaluate each proposed substitute and provide a response to the Contractor within 14 days of receipt of the Contractor's written substitution request, provide the Contractor's request has been submitted within the 35-day period.
11. As applicable, no shop drawing submittals shall be made for a substitute item nor shall any substitute item be ordered, installed, or utilized without the Engineer's prior written acceptance of the Contractor's substitution request.
12. The Engineer will record the time required by the Engineer in evaluating substitutions proposed by the Contractor and in making changes by the Contractor in the Contract Documents occasioned thereby. Whether or not the Engineer accepts a proposed substitute, the Contractor shall reimburse the District for the charges of the Engineer for evaluating each proposed substitute.
13. The Contractor's substitution request application shall contain the following statements and information which shall be considered by the Engineer in evaluating the proposed substitution:
14. The evaluation and acceptance of the proposed substitute will not prejudice the Contractor's achievement of completion on time.
15. Whether or not acceptance of the substitute for use in the Work will require a change in any of the Contract Documents to adopt the design to the proposed substitute.
16. Whether or not incorporation or use of the substitute in connection with the Work is subject to payment of any license fee or royalty.
17. All variations of the proposed substitute from the items originally specified will be identified.
18. Itemized estimate of all costs that will result directly or indirectly from acceptance of such substitute, including cost of redesign and claims of other contractors affected by the resulting change.

E. A request constitutes a representation that Contractor:
1. Has investigated proposed product and determined that it meets or exceeds quality level of specified product.
2. Will provide same warranty for Substitution as for specified product.
3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
4. Waives claims for additional costs or time extension which may subsequently become apparent.
5. Will reimburse Owner for review or redesign services associated with re-approval by authorities having jurisdiction.

F. Substitutions will not be considered when they are indicated or implied on Shop Drawing or Product Data submittals, without separate written request, or when acceptance will require revision to Contract Documents.

G. Substitution Submittal Procedure:
1. Submit three copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
2. Submit Shop Drawings, Product Data, and certified test results attesting to proposed product equivalence. Burden of proof is on proposer.
3. Engineer will notify Contractor in writing of decision to accept or reject request.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.1 PAYMENT

A. No separate or direct payment will be made for the work covered under this section of the specifications, and all costs in connection therewith will be considered a subsidiary obligation of the Contractor under Base Bid Items.

END OF SECTION

SECTION 01700

PROJECT CLOSEOUT

PART 1 GENERAL

1.1 FINAL CLEANUP

A. The Contractor shall promptly remove all rubbish, debris, unused materials, construction equipment, and temporary structures and facilities used during construction. The Contractor may not burn any material on the site. Final acceptance of the Work by the District will be withheld until the Contractor has satisfactorily complied with the foregoing requirements for final cleanup of the project site.

1.2 CLOSEOUT TIMETABLE

A. The Contractor shall establish dates for equipment testing, acceptance periods, (as required under the Contract). Such dates shall be established not less than two weeks prior to beginning any of the foregoing items, to allow the District, the Engineer, and their authorized representatives and consultants sufficient time to schedule attendance at such activities.

B. All temporary buildings, including field offices, storage buildings, and sheds shall be removed from the project site seven (7) days after completion of the Work. All temporary services such as water, power, utilities, service contracts, pager contracts, telephones, and other temporary services shall remain in service for seven (7) days following approval of substantial completion of the Work by the District, and shall be discontinued within seven (7) days after.

1.3 FINAL INSPECTION

A. The Contractor shall notify the Engineer at least ten (10) working days prior to the anticipated date of completion of all work specified in the contract. Upon completion of the work, the Engineer shall proceed with final inspection and shall complete such inspection as promptly as practicable. The time required for such inspection and the making of any corrections as a result thereof shall be included in the contract performance time.

1.4 FINAL SUBMITTALS

A. The Contractor, prior to requesting its final progress payment, shall submit the following items to the Engineer:
   1. Written guarantees or warranties.
   2. Certificates of compliance.
   3. Completed final Record Drawings.
   4. Certificates of inspection and acceptance by local governing agencies having jurisdiction.

1.5 COMPLETION OF THE WORK

A. The date of substantial completion of the Project shall be the date when the construction is sufficiently completed, in accordance with the Contract Documents, as modified by any change orders agreed to by the parties, so that the District can occupy or utilize the project for the use for which it was intended, and the District has accepted the Project.

1.6 REMAINING PUNCH LIST ITEMS

A. Upon attaining substantial completion and upon acceptance of the Work by the District, by agreement between the parties some small remaining punch list items may remain to be completed by the Contractor.

B. Failure of the Contractor to complete or correct all such outstanding punch list work to the satisfaction of the Engineer shall constitute a waiver by the Contractor of all rights to any and all claims it may have to all monies withheld by the District under the Contract to cover the value of such uncompleted or uncorrected items.

1.7 MAINTENANCE, CORRECTION AND REPAIR PERIOD

A. The Contractor shall comply with the correction and repair requirements contained in the General Conditions.

B. Replacement of earth fill or backfill, where it has settled below the required finish elevations, shall be considered as a part of such required repair work, and any repair or resurfacing constructed by the Contractor which becomes necessary by reason of such settlement shall likewise be considered as a part of such required repair work unless the Contractor shall have obtained a statement in writing from the affected private owner or public agency releasing the District from further responsibility and liability in connection with such repair or resurfacing.

C. The Contractor shall make all repairs and replacements promptly upon receipt of written order from the District. If the Contractor fails to make such repairs or replacements promptly, the District reserves the right to do the work or to have the work done by others and the Contractor and its Surety shall be liable to the District for the cost thereof.

1.8 ACCEPTANCE AND FINAL PAYMENT

A. Final acceptance is the allowance of final estimates by the Contracting Officer. The Engineer shall certify to the Contracting Officer that the contract is complete and include with the certification the amount of the final payment due the Contractor. All progress or partial payments made prior to the final payment are subject to correction in the final estimate and payment.

1.9 RELEASE OF CLAIMS

A. After completion of work, and prior to final payment, the Contractor shall furnish to the Contracting Officer a release of claims Form DI-137, properly executed by the Contractor, releasing claims against the United States arising out of the contract, other than claims specifically excepted from the operation of the release.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01740

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for the following:
   1. Recycling nonhazardous construction waste.
   2. Disposing of nonhazardous demolition and construction waste.

B. Related Sections:
   1. Section 02050 - Demolition for disposition of waste resulting from site demolition activities.

1.2 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.3 PERFORMANCE REQUIREMENTS

A. Construction Waste:
   1. Site-clearing and demolition waste.
   2. Soils.
   3. Concrete and asphalt.
   4. Lumber.
   5. Wood sheet materials.
   6. Metals.
   7. Piping and fittings.
   8. Electrical conduit.

9. Packaging: Regardless of salvage/recycle goal indicated in paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
   a. Paper.
   b. Cardboard.
   c. Boxes.
   d. Plastic sheet and film.
   e. Polystyrene packaging.
   f. Wood crates.
   g. Plastic pails.
   h. HI-5 beverage containers.
10. A minimum of 50% of the non-hazardous waste generated at the site shall be diverted to an off-site recycle, diversion, or salvage facility.

1.4 ACTION SUBMITTALS – If Applicable

A. Waste Management Plan: Submit plan within 7 days of date established for the Notice to Proceed.

1.5 INFORMATIONAL SUBMITTALS – If Applicable

A. Waste Reduction Report: Concurrent with final Application for Payment, submit report. Include the following information:

1. Material category.
2. Generation point of waste.
3. Total quantity of waste in tons.
4. Quantity of waste salvaged, both estimated and actual in tons.
5. Quantity of waste recycled, both estimated and actual in tons.
6. Total quantity of waste recovered (salvaged plus recycled) in tons.
7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

C. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

D. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

1.6 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

1.7 WASTE MANAGEMENT PLAN – If Applicable

A. General: Develop a waste management plan according to ASTM E 1609 and requirements of this Section. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

1. Comply with Division 01 Section "Temporary Facilities and Controls" for operation, termination, and removal requirements.

B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

1. Distribute waste management plan to everyone concerned within three days of submittal return.
2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
2. Comply with Division 01 Section "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 RECYCLING CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.

C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.

D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.

1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

   a. Inspect containers and bins for contamination and remove contaminated materials if found.

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

3.3 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Site-Clearing Wastes:

1. No burning of brush or any other materials will be allowed on the site.

2. Any and all organic material that has been cleared and grubbed must be stockpiled and composted such that seeds of invasive species by the heat of composting over a period of six to nine months. Composted material shall be used as organic mulch in accordance with Division 32 Section “Plants”.

C. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

3.4 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Transport waste materials off Owner's property and legally dispose of them.

D. Washing out of concrete trucks will not be allowed at the site.

END OF SECTION

SECTION 02050

DEMOLITION AND SALVAGE

PART 1 GENERAL

1.1 DESCRIPTION

A. The Contractor shall furnish all tools, equipment, materials, and supplies and shall perform all labor as required for the demolition, abandonment, or removal of equipment, structures and utilities, as indicated on the Drawings and as specified herein.

B. The Work of this Section shall include, but shall not be limited to the following items:
   1. Demolition and removal of existing pumps, piping, valves, electrical cables and conduits, control panels, instrumentation and other appurtenances as indicated on the Drawings and specified herein.

1.2 DEMOLITION/ABANDONMENT COORDINATION

A. The Contractor shall anticipate and coordinate construction demolition and improvement as shown on the Drawings and described in the Construction Documents.

B. The Contractor shall carefully coordinate the extent of the Work in areas where existing utilities shall be reconnected to new facilities and where existing facilities shall remain operational.

C. While Work is being performed, the Contractor shall provide adequate access for normal operations, including access, routine operation and maintenance. The Contractor shall erect and maintain fences, warning signs, barricades, and other devices as required for the protection of the Contractor's and District's employees and the public around pipelines, structures and excavations. The Contractor shall remove all such protection when the demolition/abandonment operations are completed, or as Work progresses, or when directed by the Engineer or District.

D. The Contractor shall coordinate all Work with the Engineer or District.

E. The Contractor shall be responsible for scheduling and coordinating any required shut down and/or relocations as necessary for performance of the work.

1.3 SUBMITTALS

A. Demolition and Abandonment Plan: The Contractor shall prepare and submit a Utility and Building Demolition and Abandonment Plan to the Engineer for review at least 14 days prior to start of demolition. The procedures shall provide for safe conduct of the Work, careful deactivation, removal and disposition of materials and equipment, protection of property which are to remain undisturbed, coordination with existing facilities to remain in service, and timely disconnection of utility services. The procedures shall include a detailed description of the methods and equipment to be used for each operation, and the sequence of operation.

1.4 REPAIR OF DAMAGE

A. Any damage to existing street improvements, utility poles, structural elements to remain, other existing utilities and facilities to remain, and private property, as caused by the Contractor's operations shall be repaired at the Contractor's expense to the satisfaction of the Engineer.

B. Damaged items shall be repaired or replaced with new materials as required to restore damaged items or surfaces to a condition equal to and matching that existing prior to damage or start of Work of this Contract.

1.5 PROTECTION OF EXISTING FACILITIES

A. Before beginning any cutting, trenching, demolition or abandonment Work, the Contractor shall carefully inspect the existing facilities to determine the extent of the Work. The Contractor shall take all necessary precautions to prevent damage to existing facilities which are to remain in place and in operation. The Contractor shall be responsible for any damages to existing facilities, which are caused by the operations of the Contractor. Damages to such facilities shall be repaired or replaced to existing condition at no additional cost to the District and to the satisfaction of the Engineer. The Contractor shall carefully coordinate the Work of this Section with all other Work and shall provide shoring, bracing, and supports, as required. The Contractor shall ensure that structural elements are not overloaded and shall be responsible for increasing structural supports or adding new supports as may be required as a result of any cutting, removal, or demolition Work performed under any part of this Contract. The Contractor shall remove all temporary protection when the Work is complete or when so authorized by the Engineer.

B. The Contractor shall carefully consider all bearing loads and capacities for placement of equipment and material.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 DEMOLITION AND ABANDONMENT OF FACILITIES

A. Demolition shall be accomplished in accordance with applicable codes and regulations. Blasting shall not be permitted.

B. The Drawings used in this Contract to indicate demolition and salvage work is based on Record Drawings and the best available information on the existing facilities. The structures and utilities may differ slightly. Prior to the submittal of bids, the Contractor shall conduct a comprehensive survey of the facilities to verify the scope of Work, the extent of utilities, and the physical sequencing constraints.

C. The Contract Drawings define the minimum portion of the structures to be removed. Unless otherwise shown on the Drawings, the Contractor may make rough cuts or breaks that exceed the limits of demolition shown.

D. All debris, materials, piping, and miscellaneous waste products from the demolition process shall be removed safely from the project site as soon as possible. They shall be disposed of in accordance with applicable federal, state, and local regulations. The Contractor is responsible for determining and complying with these regulations and shall bear all costs associated with disposal of these items.

E. All equipment, materials, and piping within the limits of the demolition shall become the property of the Contractor, unless noted otherwise on the Drawings, and shall be removed from the site.

F. No toxic or hazardous materials are anticipated for demolition or removal. If these or questionable substances are found during the demolition process, report the condition immediately to the Engineer in writing.

G. Salvage items for reuse where designated on the Drawings. Store in a safe and protected location until reinstalled. The Contractor shall be responsible for any damages to these facilities. Damages to such facilities shall be repaired or replaced with new at no additional cost to the District and to the satisfaction of the Engineer.

3.2 UTILITIES

A. The existing known utilities include sewer and electrical, and shall be maintained.

B. The Contractor shall be responsible for coordinating all utility service shut-downs with the District or District's Representative before demolition is started.

C. Where utility lines that are abandoned or are designated for abandonment are exposed by demolition excavation, they shall be removed.

D. All utilities designated to remain in service shall remain in service for the duration of the work.

3.3 PROTECTED AREAS

A. The existing structures not designated for removal, along with its associated utilities and landscaping, shall remain in place, in service and accessible to employees. The Contractor shall exercise caution when working near these structures. Any damage to this building, surrounding landscaping, or paved areas shall be repaired or replaced to original pre-contract conditions at the Contractor's sole expense. The Contractor is responsible for providing any temporary access as required for this facility.

B. All other areas of the site not within the limits of demolition and grading shown on the Drawings shall be left undisturbed. Any damage to these areas during the demolition or construction process shall be repaired or replaced to original pre-contract conditions at the Contractor's sole expense. Disturbed areas, not within the demolition and grading limits shown on the Drawings, shall be reseeded.

END OF SECTION

SECTION 02160

SHORING AND TRENCH SAFETY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Shoring required for general safety, worker protection, and protection of adjacent property from the hazards of caving ground.

B. Shoring for trench excavations.

C. Contractor's responsibilities.

D. Contractor's trench safety plan.

E. Contractor's supervisor.

1.2 CONTRACTOR'S RESPONSIBILITIES FOR SAFETY

A. The Contractor shall be solely and completely responsible for conditions of the job site, including safety of all persons (including employees) and property during performance of the work. This requirement shall apply continuously and not be limited to normal working hours.

B. Safety provisions shall conform to U.S. Department of Labor (OSHA), the California Occupational Safety and Health Act, and all other applicable Federal, State, county, and local laws, ordinances, codes, the requirements set forth below, and any regulations that may be detailed in other parts of these Specifications.

C. Contractor is advised that Part 1926 of 29 CFR, subpart P, has been revised. This regulation governs excavations, trenching and protective systems, sloping, benching, wood, and aluminum shoring for various types of soils, and depths of excavations. The Contractor shall follow these regulations (including the latest revisions) for this project.

D. Where any of these are in conflict, the more stringent requirement shall be followed.

1.3 PERMIT

A. For trenches or excavations of depth five (5) feet or deeper, the Contractor shall obtain from the State Division of Industrial Safety a permit for such excavation; submit a copy of the permit to the Engineer, prior to initiating any work requiring said permit.

1.4 CONTRACTOR SUBMITTALS

A. Submit all plans, product data, shop drawings, laboratory test results, material source information, and certificates of compliance listed in this Section under a single submittal cover for review. Incomplete submittals will not be reviewed.

B. The Contractor's attention is directed to the provisions for "Shoring and Bracing Drawings" in Section 6705 of the California Labor Code. The Contractor, prior to beginning any trench or structure excavation five (5) feet deep or greater, shall submit to the Engineer for review for compliance with Section 6705 the Contractor's detailed plan showing design of all shoring, bracing, sloping of the sides of excavation, or other provisions for worker protection against the hazard of caving ground during the excavation of such trenches or structure excavation. If such plan varies from the shoring system standards established in the Construction Safety Orders of the State of California, such alternative system plans shall be prepared, stamped and signed by a civil or structural engineer licensed in the State of California at the Contractor's expense.

C. Certificates of Compliance: Certificates of Compliance shall be provided for all products and materials proposed to be used under this Section.

D. For all materials that are not pre-approved by the District, the Contractor shall designate the source and/or submit samples of all materials in advance of their use for required testing and Engineer's approval. All testing costs shall be at the Contractor's expense.

1.5 SAFETY ORDERS

A. The Contractor shall have at the work site, copies or suitable extracts of the Construction Safety Orders of Cal-OSHA, and Part 1926 of 29 CFR, subpart P.

B. All work shall comply with the provisions of these and all other applicable laws, ordinances and regulations.

1.6 TRENCH SAFETY PLAN

A. For trenches and excavations five feet or more in depth, the Contractor shall submit to the Engineer a detailed plan, design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazards of caving ground.

B. If such plan varies from the shoring system standards established by the Construction Safety Orders, or Part 1926 of 29 CFR, Subpart P, the plan shall be prepared, sealed and signed by a civil or structural engineer registered in California. Signed and sealed copies of calculations necessary to quality the system shall also be submitted.

C. Nothing herein shall be deemed to allow the use of shoring, sloping, or protective system less effective than that required by the Construction Safety Orders of the Division of Industrial Safety, or Part 1926 of 29 CFR, subpart P.

D. If Contractor proposes to use trench jacks or speed shores, submittals shall show length and type of shoring vertical and horizontal spacing, vertical or horizontal wales and planks. Shields, when proposed or used, shall show depth allowed in the soils expected to be encountered.

1.7 ENGINEER'S REVIEW

A. The duty of the Engineer to conduct construction review of the Contractor's performance is not intended to include a review or approval of the adequacy of the Contractor's safety supervisor, the safety program, or any safety measures taken in, on, or near the construction site.

B. The Engineer will review the submittal of the Contractor's proposed shoring system to verify the general scope of the Work, to determine that qualified professional engineering services are used and to determine that appropriate construction techniques are proposed for use. This review shall not in any way be construed to relieve the Contractor from sole responsibility for the design and safety of such shoring.

1.8 CONTRACTOR'S SUPERVISOR

A. The Contractor shall appoint a qualified supervisory employee who shall be responsible to determine the sloping or shoring system which shall be used depending on local soil type, water table, stratification, depth, etc.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 02230

SITE CLEARING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Removing surface debris.
   2. Removing designated paving.
   3. Removing designated trees, shrubs, and other plant life.
   4. Removing, relocating or resetting of above-grade site improvements.
   5. Clearing and grubbing.
   6. Excavating topsoil.

B. Limits of Work: Minimize disturbance within clearing limits. Perform only as much clearing as required to complete the Work.

C. Related Sections:
   1. Section 02050 – Demolition and Salvage.
   2. Section 02200 – Earthwork.

1.2 Definitions

A. Clearing Limits: Areas within street right-of-way lines, permanent and temporary easements, and as directed on private property.

B. Site Improvements: Miscellaneous structures and site elements, including pavement, curbing, fences, railings, signs, mailboxes, property line markers, pipes, poles and wires.

C. Topsoil: Natural or cultivated surface-soil later containing organic matter and sand, silt and clay particles; reasonably free of subsoil, clay lumps, gravel and other objects more than 2 inches in diameter; and free of weeds, roots and other deleterious materials.

1.3 SUBMITTALS

A. Section 01300 - Shop Drawings and Submittals.

1.4 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks and other adjacent occupied or used facilities during site-clearing operations.
   1. Do not close or obstruct streets, walks or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
   2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

B. Protect In-Place Existing Site Improvements: Support and protect in-place existing site improvements. Items include pipes, poles, wires, mailboxes, fences, curbing, property line

markers, and other structures. Restore items promptly; do not leave until end of construction.

C. Remove and Reset Existing Site Improvements: Remove and protect items to be reset upon completion of construction.

D. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.

E. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.

F. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in-place.

G. Restore items and surfaces damaged by Contractor's construction operations to existing conditions or better.

H. Equipment Operations:
   1. On paved surfaces, do not operate equipment with tracks, treads or wheels that cut or otherwise damage paved surfaces.
   2. Operate equipment with care to prevent injury to trees and overhanging branches and limbs.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 00450 – Site Visit Affidavit: Verification of existing conditions before starting work.

B. Verify existing plant life designated to remain is tagged or identified.

3.2 PREPARATION

A. Call Underground Service Alert (USA) at 1-800-642-2444 or 811 not less than 48 hours in advance of excavation activities. See Section 01140 – Work Restrictions.
   1. Request underground utilities to be located and marked within and surrounding construction areas.

3.3 PROTECTION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Locate and clearly flag trees to be removed. For tree protection, see Section 01360 – Environmental Controls.

C. Protect existing site improvements to remain from damage during construction.

3.4 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties, according to requirements of authorities having jurisdiction.

B. Inspect, repair and maintain erosion and sedimentation control measures during construction.

3.5 CLEARING

A. Clear areas required for access to site and execution of Work to a minimum depth of 12 inches.

B. Remove trees and shrubs as indicated. Remove stumps, roots and root ball.

C. Clear undergrowth and deadwood, without disturbing subsoil.

3.6 REMOVAL

A. See Section 02050 – Demolition and Salvage.

B. Remove paving. Neatly saw cut edges at right angle to surface.

C. Remove abandoned utilities. Indicated removal termination point for underground utilities on Record Documents.

D. Continuously clean-up and remove waste materials from site. Do not allow materials to accumulate on site.

E. Do not burn or bury materials on site. Leave site in clean condition.

3.7 TOPSOIL EXCAVATION

A. Excavate topsoil from marked areas, without mixing with foreign materials for use in finish grading.

B. Do not excavate wet topsoil.

C. Stockpile in area designated on site to depth not exceeding 8 feet and protect from erosion. Stockpile material on impervious material and cover to prevent windblown dust, until disposal.

D. Remove excess topsoil not intended for reuse, from site.

END OF SECTION

SECTION 02270

SOIL EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.1 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

1. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

a.	ASTM D 4439-14	Standard Terminology for Geosynthetics
b.	ASTM D 4491-14	Water Permeability of Geotextiles by Permittivity
c.	ASTM D 4533-11	Trapezoid Tearing Strength of Geotextiles
d.	ASTM D 4632-13	Grab Breaking Load and Elongation of Geotextiles
e.	ASTM D 4751-12	Determining Apparent Opening Size of a Geotextile
f.	ASTM D 4873-09	Identification, Storage, and Handling of Geosynthetic Rolls

B. California Department of Transportation, Standard Specifications, Section 13 Water Pollution Control.

C. Field Guide for Construction Site Dewatering.

D. Storm Water Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP) Preparation Manual (June 2011).

E. Construction Site Best Management Practices (BMP) Manual.

F. Construction Site Monitoring Program (CSMP) Guidance Manual.

G. Manuals and templates are available at Caltrans Division of Construction website: http://www.dot.ca.gov/hq/construc/stormwater/.

1.2 GENERAL

A. A Storm Water Pollution Prevention Plan (SWPPP) document is not required for this project.

B. The Contractor shall prepare a Water Pollution Control Plan (WPCP) for review and approval by the Engineer, and implement water pollution prevention measures outlined in the approved WPCP, specified in this specification section, in Standard Specification Section 13, and the requirements of the National Pollution Discharge Elimination System (NPDES).

C. The Contractor shall become fully informed of, and comply with the applicable Federal, State and local regulations that govern the Contractor's operations and storm water discharges from both the project site and areas of disturbance outside the project limits during construction.

D. Unless arrangements for disturbance of areas outside the project limits are made by the District and made part of the contract, it is expressly agreed that the District assumes no

responsibility to the Contractor or property owner whatsoever with respect to any arrangements made between the Contractor and property owner to allow disturbance of areas outside the project limits.

E. The Contractor shall be responsible for the costs and for any liability imposed by law as a result of the Contractor's failure to comply with the requirements set forth in this section including, but not limited to, compliance with the applicable provisions of Federal, State and local regulations. For the purposes of this paragraph, costs and liabilities include but are not limited to fines, penalties and damages whether assessed against the State or the Contractor, including those levied under the Federal Clean Water Act and the State Porter Cologne Water Quality Act.

F. Conformance with the requirements of this section "Water Pollution Control," shall not relieve the Contractor from the Contractor's responsibilities, as provided in Section 5-1.36, "Property and Facility Preservation," Section 7-1.05, "Indemnification," and Section 7-1.06, "Insurance," of the Standard Specifications.

G. Earthwork construction activities shall be limited to May 15 through November 15.

H. Heavy equipment shall be placed outside of drainage channels except when necessary to perform the Work.

I. Upon completion of construction activities, drainage channels shall be restored and re-contoured as nearly as practicable to pre-project conditions, and shall match adjacent natural channel contours.

J. All cleared and grubbed materials shall be removed from the project sites and disposed of by the Contractor. Refer to Specification Section 02 41 10 "Demolition, Salvage and Abandonment" for additional details and requirements.

1.3 EROSION AND SEDIMENT CONTROLS

A. The controls and measures required by the Contractor include but are not limited to the items below.

1. Structural Practices: Structural practices shall be implemented to divert flows from exposed soils, temporarily store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site. Structural practices shall be implemented in a timely manner during the construction process to minimize erosion and sediment runoff. Structural practices shall include the following devices.

a. Silt Fences. The Contractor shall provide silt fences as a temporary structural practice to minimize erosion and sediment runoff. Silt fences shall be properly placed and installed to effectively retain sediment immediately after completing each phase of work where erosion would occur in the form of sheet and rill erosion (e.g. clearing and grubbing, excavation, embankment, and grading). Silt fences shall be installed in the locations indicated on the drawings. Final removal of silt fence barriers shall be upon approval by the Owner.

b. Fiber Rolls (sediment logs or wattles): Contractor shall provide fiber rolls as temporary structural practice to minimize erosion and sediment runoff. Fiber rolls shall be properly placed and installed to effectively retain sediment immediately after completing each phase of work (e.g., clearing and grubbing, excavation, embankment, and grading) in each independent runoff area (e.g.,

after clearing and grubbing in an area between a ridge and drain, fiber rolls shall be placed as work progresses; fiber rolls shall be removed/replaced/relocated as needed for work to progress in the drainage area). Areas where fiber rolls are to be used are shown on the drawings. Final removal of fiber roll barriers shall be upon approval by the Owner. Fiber Rolls shall be provided as follows:

1) Along the downhill perimeter edge of all areas disturbed.
2) Along the top of the slope or top bank of drainage ditches, channels, swales, etc. that traverse disturbed areas.
3) Along the toe of all cut slopes and fill slopes of the construction areas.
4) Perpendicular to the flow in the bottom of existing drainage ditches, channels, swales, etc. that traverse disturbed areas or carry runoff from disturbed areas. Rows shall be spaced a maximum of 100 feet apart.
5) Perpendicular to the flow in the bottom of new drainage ditches, channels, and swales. Rows shall be spaced a maximum of 100 feet apart.
6) At the entrance to culverts that receive runoff from disturbed areas.

c. Diversion Dikes. Diversion dikes shall have a maximum channel slope of 2 percent and shall be adequately compacted to prevent failure. The minimum height measured from the top of the dike to the bottom of the channel shall be 18 inches. The minimum base width shall be 6 feet and the minimum top width shall be 2 feet. The Contractor shall ensure that the diversion dikes are not damaged by construction operations or traffic. Diversion dikes shall be located as shown on the drawings.

1.4 SUBMITTALS

A. Prepare and submit a Water Pollution Control Plan, including a minimum of one (1) 11”x17” figure showing the details of the water pollution control measures and Best Management Practices (BMPs) that will be implemented.

1. As part of the water pollution control work, a Water Pollution Control Program, hereafter referred to as the "WPCP," is required for this contract. The WPCP shall conform to the requirements in Section 13-2, "Water Pollution Control Program," of the Standard Specifications, the requirements in the Caltrans manuals, and these Construction Details.

2. No work having potential to cause water pollution, as determined by the Engineer, shall be performed until the WPCP has been approved by the Engineer.

3. Within 30 calendar days after the approval of the contract, the Contractor shall submit 3 copies of the WPCP to the Engineer. The Contractor shall allow 10 days for the Engineer to review the WPCP. If revisions are required, as determined by the Engineer, the Contractor shall revise and resubmit the WPCP within 7 days of receipt of the Engineer's comments and shall allow 7 days for the Engineer to review the revisions. Upon the Engineer's approval of the WPCP, 3 additional copies of the WPCP incorporating the required changes shall be submitted to the Engineer. Minor changes or clarifications to the initial submittal may be made and attached as amendments to the WPCP. In order to allow construction activities to proceed, the Engineer may conditionally approve the WPCP while minor revisions or amendments are being completed. The objectives of the WPCP shall be to identify pollution sources that may adversely affect the quality of storm water discharges associated with the

project and to identify, construct, implement and maintain water pollution control measures, hereafter referred to as control measures, to reduce to the extent feasible pollutants in storm water discharges from the construction site during construction under this contract.

4. The WPCP shall incorporate control measures and minimum requirements in the following categories:
   a. Soil stabilization practices;
   b. Sediment control practices;
   c. Wind Erosion Control practices;
   d. Tracking control practices;
   e. Non-storm water management and waste management and materials disposal control practices.

5. Specific objectives and minimum requirements for each category of control measures are contained in the Storm Water Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP) Preparation Manual.

6. The Contractor shall consider the objectives and minimum requirements presented in the SWPPP-WPCP Preparation Manual for each of the above categories. When minimum requirements are listed for any category, the Contractor shall incorporate into the WPCP and implement on the project, one or more of the listed minimum controls required in order to meet the pollution control objectives for the category. In addition, the Contractor shall consider other control measures presented in the SWPPP-WPCP Preparation Manual and shall incorporate into the WPCP and implement on the project the control measures necessary to meet the objectives of the WPCP. The Contractor shall document the selection process in accordance with the procedure specified in the SWPPP-WPCP Preparation Manual.

7. The following contract items of work, as shown on the project Plans, shall be incorporated into the WPCP as critical temporary control measures:
   a. During construction and as part of the erosion control measures:
      1) Place silt fence 1' minimum beyond all grading limits.
      2) Place fiber rolls around all soil stock piles and at the grading limits.
      3) Place straw bales or rock bags around all storm drain inlets.
      4) The Contractor shall consider other control measures to supplement these critical temporary control measures when necessary to meet the pollution control objectives of the WPCP.

8. The Contractor shall maintain and protect the temporary control measures throughout the duration of the project and shall restore these controls to the lines and grades shown on the Plans prior to acceptance of the project.

9. The WPCP shall include, but not be limited to, the following items as described in the Handbook:
   a. Project description and Contractor's certification;
   b. Project information;
   c. Pollution sources, control measures, and water pollution control drawings; and
   d. Amendments, if any.

10. The Contractor shall amend the WPCP, graphically and in narrative form, whenever there is a change in construction activities or operations which may affect the discharge of significant quantities of pollutants to surface waters, ground waters, municipal storm drain systems, or when deemed necessary by the Engineer. The WPCP shall also be amended if the WPCP has not achieved the objective of reducing pollutants in storm water discharges. Amendments shall show additional control measures or revised operations, including those in areas not shown in the initially approved WPCP, which are required on the project to control water pollution effectively. Amendments to the WPCP shall be submitted for review and approval by the Engineer in the same manner specified for the initially approved WPCP. Amendments shall be dated and attached to the on-site WPCP document.

11. The Contractor shall keep a copy of the WPCP, together with updates, revisions and amendments at the project site.

B. Submit all product data, laboratory test results, material source information, and certificates of compliance listed in this Section under a single submittal cover for review. Incomplete submittals will not be reviewed.

C. Product Data:
   1. Submit data for erosion control materials listed in this section indicating properties, test methods, and manufacturer's installation instructions.

D. Material Source: Submit name of imported fill materials supplied.

E. Manufacturer's Certificate: Submit Certifications that products meet or exceed specified requirements.

PART 2 - PRODUCTS

2.1 TEMPORARY CONSTRUCTION FENCE

A. General:
   1. Fence height shall be 4 feet located from top of ground to top of fence.
   2. Fence shall extend from the top of ground. No gaps between the fence and the top of ground shall be permitted.

B. Fabric:
   1. Fence material shall be plastic.
   2. Fence material shall be orange in color.
   3. Fence material shall be resistant to temperature change and shall be UV protected.

C. Framing and Accessories:
   1. Provide posts and accessories necessary to erect fence in location desired.
   2. Posts shall be either fiberglass or steel, specifically made for the installation of fencing.
   3. Fencing shall be secured to the posts through the use of nylon ties or nylon wire (minimum 12 gauge). Steel wire shall not be used.

2.2 TEMPORARY SILT FENCES

A. The filter fabric shall meet the requirements of Section 88-1.02E of the State Standard Specifications.
   1. Type: Woven.

B. Mill Certificate or Affidavit. A mill certificate or affidavit shall be provided attesting that the fabric and factory seams meet chemical, physical, and manufacturing requirements specified above.

C. The Contractor may use either wooden stakes or steel posts for silt fence construction. Wooden stakes utilized for silt fence construction, shall have a minimum cross section of 2 inches by 2 inches when oak is used and 4 inches by 4 inches when pine is used. Steel posts (standard "U" or "T" section) utilized for silt fence construction, shall have a minimum weight of 1.33 pounds per linear foot.

2.3 TEMPORARY FIBER ROLLS (sediment logs or wattles)

A. Standard Specifications, Section 21-1.02P Fiber Rolls.
   1. Type A or Type B
   2. 8 – 10 inches in diameter, 10 – 20 feet long.

B. Standard Specifications, Section 13-6.03E Temporary Fiber Rolls.

C. The Contractor shall use wooden stakes for fiber roll installation. Wooden stakes utilized for fiber roll installation, shall have a minimum cross section of 1 inch by 2 inches, or as suggested by the fiber roll manufacturer.

2.4 EROSION CONTROL BLANKETS

A. Standard Specifications, Section 21-1.02O Jute Mesh or Netting.

2.5 TEMPORARY COVERS

A. Standard Specifications, Section 13-5.02F Temporary Covers.

B. Standard Specifications, Section 88-1.02H Temporary Covers.

2.6 GRAVEL-FILLED BAGS

A. Standard Specifications, Section 13-5.02G Gravel-Filled Bags.

B. Standard Specifications, Section 88-1.02F Gravel-Filled Bags.

2.7 SEDIMENT FILTER BAGS

A. Standard Specifications, Section 88-1.02G Sediment Filter Bag.

2.8 TEMPORARY HYDRAULIC MULCH

A. Standard Specifications, Section 13-5.03E Temporary Hydraulic Mulch (Bonded Fiber Matrix).

B. Standard Specifications, Section 13-5.03F Temporary Hydraulic Mulch (Polymer-Stabilized Fiber Matrix).

2.9 TEMPORARY TACKED STRAW

A. Standard Specifications, Section 13-5.03H Temporary Tacked Straw.

2.10 TEMPORARY HYDROSEED

A. Standard Specifications, Section 13-5.03I Temporary Hydroseed.

PART 3 - EXECUTION

3.1 GENERAL

A. Upon approval of the WPCP, the Contractor shall be responsible throughout the duration of the project for installing, constructing, inspecting and maintaining the control measures included in the WPCP and any amendments thereto and for removing and disposing of temporary control measures. Unless otherwise directed by the Engineer or specified in these construction details, the Contractor's responsibility for WPCP implementation shall continue throughout any temporary suspension of work ordered in accordance with Section 8 1.06, "Suspensions," of the Standard Specifications. Requirements for installation, construction, inspection, maintenance, removal and disposal of control measures are specified in the Handbook and these construction details.

B. Soil stabilization practices and sediment control measures, including minimum requirements, shall be provided throughout the duration of the project.

C. Implementation of soil stabilization practices and sediment control measures for soil-disturbed areas of the project site shall be completed prior to the start of any other construction activities.

D. Throughout the winter season, the active, soil-disturbed area of the project site shall be no more than 0.04 acres. The Engineer may approve, on a case-by-case basis, expansions of the active, soil-disturbed area limit. The Contractor shall demonstrate the ability and preparedness to fully deploy soil stabilization practices and sediment control measures to protect soil-disturbed areas of the project site before the onset of precipitation. The Contractor shall maintain a quantity of soil stabilization and sediment control materials on site equal to 30 percent of that sufficient to protect unprotected, soil-disturbed areas on the project site and shall maintain a detailed plan for the mobilization of sufficient labor and equipment to fully deploy control measures required to protect unprotected, soil-disturbed areas on the project site prior to the onset of precipitation. The Contractor shall include a current inventory of control measure materials and the detailed mobilization plan as part of the WPCP.

E. Soil-disturbed areas of the project site shall be considered to be non-active whenever soil disturbing activities are expected to be discontinued for a period of 10 or more days

and the areas are fully protected. Areas that will become non-active shall be fully protected with soil stabilization practices and sediment control measures within 5 days of the discontinuance of soil disturbing activities or prior to the onset of precipitation, whichever is first to occur.

F. Active soil-disturbed areas of the project site shall be fully protected at the end of each day with soil stabilization practices and sediment control measures unless fair weather is predicted through the following work day. The weather forecast shall be monitored by the Contractor on a daily basis.

G. The National Weather Service (http://www.weather.gov/) forecast shall be used. If precipitation is predicted prior to the end of the following work day, construction scheduling shall be modified, as required, and the Contractor shall deploy functioning control measures prior to the onset of the precipitation.

H. The Contractor shall implement, year-round and throughout the duration of the project, control measures included in the WPCP for sediment tracking, wind erosion, non-stormwater management and waste management and disposal.

I. The Engineer may order the suspension of construction operations which create water pollution if the Contractor fails to conform to the requirements of this section "Water Pollution Control" as determined by the Engineer.

3.2 INSTALLATION OF TEMPORARY CONSTRUCTION FENCE

A. Posts:
1. Posts shall be installed plumb and in straight alignment.
2. Posts shall be spaced every 6.5 feet maximum, unless otherwise approved by the Engineer.

B. Fabric:
1. Fabric shall be stretched taut between fence posts. Equal tension shall be applied so that fence remains straight and taut between posts.
2. Install fabric on security side of fence and anchor to posts so that fabric remains in tension after pulling force is released.
3. Fasten fabric to posts with nylon ties or nylon wire spaced 12 inches maximum.

C. Maintenance:
1. Fence shall not be allowed to be in disrepair. All breaks or tears in the fence fabric will be repaired immediately.
2. All posts shall remain plumb and in straight alignment. All fallen posts shall be reset immediately.
3. Contractor shall maintain temporary construction fencing in such a manner as to protect Work from damage and to protect the safety of the general public.
4. No Contractor personnel or equipment shall be allowed outside of the fenced construction easement area.

3.3 INSTALLATION OF SILT FENCES

A. Silt fences shall extend a minimum of 16 inches above the ground surface and shall not exceed 34 inches above the ground surface. Filter fabric shall be from a continuous roll cut

to the length of the barrier to avoid the use of joints. When joints are unavoidable, filter fabric shall be spliced together at a support post, with a minimum 6 inch overlap, and securely sealed. A trench shall be excavated approximately 4 inches wide and 4 inches deep on the upslope side of the location of the silt fence. The 4-inch by 4-inch trench shall be backfilled and the soil compacted over the filter fabric. Silt fences shall be removed upon approval by the Owner

B. Maximum spacing for post supports shall be 6 feet on center. Posts shall be buried 12 inches minimum and shall not exceed 36-inches above the ground surface.

3.4 INSTALLATION OF FIBER ROLLS (sediment logs or wattles)

A. Fine grade the subgrade by hand dressing where necessary to remove local deviations and to remove larger stones or debris that will inhibit intimate contact of the fiber roll with the subgrade. Prior to roll installation, contour a concave key trench 2 to 4 inches deep along the proposed installation route. Soil excavated in trenching should be placed on the uphill or flow side of the roll to prevent water from undercutting the roll.

B. Place fiber rolls into the key trench and stake on both sides of the roll within 6 feet of each end. Spacing for stakes shall be 3 to 5 feet. Stakes are typically driven in on alternating sides of the roll. Stakes shall be buried 12 inches minimum.

C. When more than one fiber roll is placed in a row, the rows should be abutted securely to one another to provide a tight joint, not overlapped. Fiber rolls shall be placed in a single row, lengthwise on the contour, with ends of adjacent rolls tightly abutting one another.

3.5 INSTALLATION OF OTHER SEDIMENT AND EROSION CONTROLS

A. Install other sediment and erosion controls in accordance with project SWPPP and Standard Specification Section 13.

3.6 MAINTENANCE

A. The Contractor shall maintain the temporary and permanent vegetation, erosion and sediment control measures, and other protective measures in good and effective operating condition by performing routine inspections to determine condition and effectiveness, by restoration of destroyed vegetative cover, and by repair of erosion and sediment control measures and other protective measures. The following procedures shall be followed to maintain the protective measures.

1. Silt Fence Maintenance. Silt fences shall be inspected in accordance with paragraph INSPECTIONS. Any required repairs shall be made promptly. Close attention shall be paid to the repair of damaged silt fence resulting from end runs and undercutting. Should the fabric on a silt fence decompose or become ineffective, and the barrier is still necessary, the fabric shall be replaced promptly. Sediment deposits shall be removed when deposits reach one-third of the height of the barrier. When a silt fence is no longer required, it shall be removed. The immediate area occupied by the fence and any sediment deposits shall be shaped to an acceptable grade. The areas disturbed by this shaping shall be re- vegetated.
2. Fiber Roll Maintenance. Fiber roll barriers shall be inspected in accordance with paragraph INSPECTIONS. Close attention shall be paid to the repair of damaged rolls,

end runs and undercutting beneath rolls. Necessary repairs to barriers or replacement of rolls shall be accomplished promptly. Sediment deposits shall be removed when deposits reach one-half of the height of the barrier. Roll rows used to retain sediment shall be turned uphill at each end of each row. When a fiber roll barrier is no longer required, it shall be removed. The immediate area occupied by the roll and any sediment deposits shall be shaped to an acceptable grade. The areas disturbed by this shaping shall be re-vegetated.

3.7 INSPECTIONS

A. General. The Contractor shall inspect disturbed areas of the construction site, areas used for storage of materials that are exposed to precipitation that have not been finally stabilized, stabilization practices, structural practices, other controls, and area where vehicles exit the site at least once every seven (7) calendar days, within two (2) calendar days of forecasted rains, and within 24 hours of the end of any storm that produces 0.5 inches or more rainfall at the site. Where sites have been finally stabilized, such inspection shall be conducted at least once every month.

B. Inspections Details. Disturbed areas and areas used for material storage that are exposed to precipitation shall be inspected for evidence of, or the potential for, pollutants entering the drainage system. Erosion and sediment control measures identified in the Storm Water Pollution Prevention Plan shall be observed to ensure that they are operating correctly. Discharge locations or points shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters. Locations where vehicles exit the site shall be inspected for evidence of offsite sediment tracking.

C. Inspection Reports. For each inspection conducted, the Contractor shall prepare a report summarizing the scope of the inspection, name(s) and qualifications of personnel making the inspection, the date(s) of the inspection, major observations relating to the implementation of the Storm Water Pollution Prevention Plan, maintenance performed, and actions taken. The report shall be furnished to the Engineer within 24 hours of the inspection as a part of the Contractor's work. A copy of the inspection report shall be maintained on the job site.

END OF SECTION

SECTION 02300

EARTHWORK – As applicable

PART 1 - GENERAL

1.1 DESCRIPTION

A. Earthwork shall consist of performing all operations necessary for excavation, subgrade preparation and grading where applicable.

B. Related Sections:

1. Section 02050 – Demolition and Salvage.
2. Section 02160 – Shoring and Trench Safety.
3. Section 02230 – Site Clearing.
4. Section 02315 – Trench Excavation and Backfill.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Codes: All Work shall comply with all codes, as referenced herein.

B. Commercial Standards:

1. ASTM D 422 Method for Particle-Size Analysis of Soils.
2. ASTM D 1556 Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
3. ASTM D 1557 Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.54-kg) Rammer and 18-in (457-mm) Drop.
4. ASTM D 2487 Classification of Soils for Engineering Purposes.
5. ASTM D 2922 Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
6. ASTM D 4829 Standard Test Method for Expansion Index of Soils

1.3 CONTRACTOR SUBMITTALS

A. Compaction test results, laboratory test results.

B. Submit copies of grading permits, and permits for disposal of material, if required.

1.4 QUALITY ASSURANCE

A. General: All soils testing will be done by a testing laboratory of the District's choice, and as described in Section 01400, "Quality Control." The Contractor shall provide the Engineer at least 24 hours' notice in advance of required tests.

B. Where soil material is required to be compacted to a percentage of maximum density, the maximum density at optimum moisture content will be determined in accordance with ASTM D 1557. In-place, field-density tests will be performed in accordance with ASTM D 1556, ASTM D 2922, or by such other means acceptable to the Engineer.

C. Prior to the general placement of any materials and during such placement, the Engineer will select areas within the limits of any work for testing the degree of compaction obtained. The Contractor shall cooperate fully in obtaining the information desired. The frequency of testing shall be as determined and completed by the Engineer. Testing shall be in accordance with the ASTM references listed above.

D. In case the tests of the fill or backfill show noncompliance with the required density, the Contractor shall accomplish such remedy as may be required to ensure compliance. Subsequent testing to show compliance shall be by a testing laboratory selected by the District and shall be at the Contractor's expense.

E. Particle size analysis of soils and aggregates will be performed using ASTM D 422.

F. Unified Soil Classification System: References in these specifications to soil classification types and standards are set forth in ASTM D 2487. The Contractor shall be bound by all applicable provisions of said ASTM D 2487 in the interpretation of soil classifications.

G. Determination of the Expansion Index of the soils shall be in accordance with ASTM D 4829.

1.5 JOB CONDITIONS

A. Protection:

1. Protect adjacent structures and surrounding areas from damage during excavation, filling, and backfilling.
2. Do not remove trees from outside excavation or fill areas unless authorized by the Engineer; protect from permanent damage by construction activities.
3. Protect Work from erosion or other similar types of damage until the Project has been completed.

B. Weather:

1. Do not backfill or construct fills or embankments during freezing weather or during periods of heavy rainfall when soil moisture conditions will not permit achieving required compaction.
2. Do not use frozen materials, snow, or ice in any backfill, fill area or embankment.
3. Do not backfill or construct fill or embankments on frozen surfaces.

PART 2 - PRODUCTS

2.1 SUITABLE MATERIAL

A. Use of onsite materials is acceptable as long as the material does not contain deleterious matter, particles greater than 3 inches in maximum dimension, and is not highly plastic. Highly plastic shall be defined as having a Plasticity Index of greater than 25 or and Expansion Index of 51 or greater.

B. Import Material: In general, any unsuitable material that requires removal shall be replaced with Class 2 Aggregate as specified below. If import material is required for site grading operations it shall be granular, low to non-expansive material. The Engineer shall approve any import material prior to use.

C. The following types of backfill materials are designated and defined as follows:

1. Sand: 100 percent passing a 3/8-inch sieve, at least 90 percent passing a Number 4 sieve, and a sand equivalent value not less than 28.
2. Class 2 Aggregate Base: The aggregate base shall conform to the provisions of Section 26 (Class 2 Aggregate) of the Caltrans Specifications for 1 1/2-inch maximum grading.
3. Crushed Rock: The crushed rock shall be 1 ½ " ASB.
4. Drain Rock: Drain rock shall be crushed stone, or gravel, durable and free from slaking or decomposition under action or alternate wetting or drying. The material shall meet the following gradation requirements:

Sieve Size	Percentage Passing
2-inch	100
1 ½-inch	90 - 100
3/4-inch	5 - 30
3/8-inch	5 - 20
No. 200	0 - 4

5. Topsoil: Material that has been obtained at the site by removing soil to a depth not less than 4 inches and not exceeding 2 feet. Removal of the topsoil shall be done after the area has been stripped of vegetation and debris.

2.2 UNSUITABLE MATERIAL

A. Unsuitable Material: Unsuitable soils for use as fill material shall include soils which, when classified under ASTM D 2487, fall in the classifications of Pt, OH, CH, MH, or OL. In addition, any soil that cannot be compacted sufficiently to achieve the percentage of maximum density specified for the intended use shall be classified as unsuitable material.

B. Saturated native materials which are over optimum moisture content shall not be considered "unsuitable" simply because they are too wet for proper compaction. The Contractor shall, at its cost, prepare these materials in accordance with this specification. Alternatively, the Contractor may remove the native materials and provide imported backfill material, at no additional cost to the District.

PART 3 - EXECUTION

3.1 GENERAL EXCAVATION

A. Excavation shall be made to such widths as will give safe room for construction of structures and utilities including bracing, supporting, pumping, and draining. The bottom of the excavations shall be rendered firm and dry.

3.2 STOCKPILING OF EXCAVATED MATERIAL

A. The Contractor may stockpile excavated materials in storage piles within each pump station site. Construct storage piles to freely drain and not impound surface water. Cover storage piles as required to prevent wind blown dust or erosion.

3.3 DISPOSAL OF EXCESS EXCAVATED MATERIAL

A. Materials which are removed from the worksite to accommodate the installation of new facilities shall become the property of the Contractor and shall be disposed of at a legal dumpsite. However, the District will accept excess excavated materials that is free of concrete, asphalt, garbage and any other debris that is not considered native material in the District Engineer's or his designee's opinion. In this instance the excess material can be disposed at the location approved by the District.

3.4 PREPARATION OF GRADE

A. Loose materials shall be removed from all cut surfaces. Exposed soils shall be scarified to a minimum depth of 6 inches and moistened or dried to the moisture content noted on Section 3.7 below. Material shall be re-compacted to 90 percent compaction noted below based on ASTM D 1557 prior to placing any required backfill or base course.

B. The bottom of all excavations shall be rendered firm and dry.

3.5 FILL PLACEMENT- GENERAL

A. Backfill shall not be dropped directly upon any structure or pipe. Backfill shall not be placed around nor upon any structure until the concrete has attained sufficient strength to withstand the loads imposed.

B. Fill shall not be placed until after all water is removed from the excavation.

3.6 PLACING AND SPREADING OF FILL MATERIALS

A. Fill materials and excavated materials to construct berms shall be placed and spread evenly in layers. The fill layers shall be evenly spread so that each layer shall not exceed 8 inches in uncompacted thickness.

B. During spreading, each layer shall be thoroughly mixed as necessary to promote uniformity of material in each layer.

C. Where the backfill material moisture content is below the optimum moisture content, water shall be added before or during spreading until the proper moisture content for compaction is achieved.

D. Where the backfill material moisture content is too high to permit the specified degree of compaction, the material shall be bladed, aerated, or dried and/or mixed with suitable material with lower moisture content until the moisture content is satisfactory.

3.7 COMPACTION OF FILL MATERIALS

A. Each layer of fill material shall be mechanically compacted to the specified percentage of maximum density. Equipment that is consistently capable of achieving the required degree of compaction shall be used, and each layer shall be compacted over its entire area while the material is at the required moisture content.

B. Flooding, ponding, or jetting shall not be used.

C. Compaction Requirements: The following compaction requirements shall be in accordance with ASTM D 1557. In general, non-clayey soils shall be compacted to at least 95% of maximum dry density (ASTM D 1557) at a moisture content above optimum. Where otherwise indicated on the drawings or where agency, utility company, or encroachment permit requirements govern, the highest compaction standards shall apply.

D. No placement or compacting shall be done when either the previously placed or the new materials are too wet from rain or excess application of water to obtain the compaction specified. At such time, work shall be suspended until the previously placed and/or new materials have dried sufficiently to permit proper compacting.

END OF SECTION

SECTION 02315

TRENCH EXCAVATION AND BACKFILL

PART 1 GENERAL

1.1 SUMMARY

A. Section includes: The Work covered in this section consists of performing all operations necessary to excavate all earth, regardless of character and subsurface conditions, from the trench or adjacent thereto and to place stabilization, bedding, cover, water removal, backfill, base, and compaction as shown on the Drawings and as specified, or as may be ordered by the Engineer.

B. Such earthwork shall include, but may not necessarily be limited to, the loosening, removing, loading, transporting, depositing, and compacting in its final location of all materials wet and dry, as required for the purposes of completing the Work, which shall include, but not necessarily be limited to, the furnishing, placing, and removing of sheeting, shoring and bracing necessary to safely support the sides of all excavations; all pumping, ditching, draining and other required measures for the removal or exclusion of water from the excavation; the supporting of structures above and below the ground; all backfilling around structures and all backfilling of trenches and pits; the disposal of excess excavated materials; borrow of materials to make up deficiencies for fills; and all other incidental earthwork.

C. General intent:
   1. It is the general intent of these specifications to specify conduct of the Work in such manner as to cause no exposure to unsafe conditions during construction and to provide a trench that will properly support and protect the pipe and only minor settlement in areas where such settlement will not be noticed, or compensation made for any expected settlement. The degree of compaction and type of material will vary in accordance with type of pipe, and soil and surface conditions.
   2. The Contractor shall obtain compaction and install base and temporary paving. He shall keep access roads clean and free of dust, mud or debris by providing cleanup as necessary.
   3. If the Contractor does not properly clean up, (to preconstruction conditions) the District shall have the option of using outside equipment and labor to perform the Work and such costs will be deducted from the contract.
   4. Stabilization material will be required only where soil conditions warrant and as directed by the Engineer.
   5. No backfilling shall be done until the installation to be covered has been inspected and approved for covering. Compaction of backfill shall proceed immediately after backfilling, in appropriate layers.
   6. During construction, heavy rains may be encountered causing wet backfill and other unsuitable working conditions. During these periods the District will have authority to shut down the Work to avoid poor working conditions, wet unsuitable backfill, damage to base and paving, unsafe conditions, etc.

D. Contaminated soil and groundwater shall be handled in accordance with Section 02200, "Earthwork," and all regulatory agency requirements.

1.2 QUALITY ASSURANCE

A. Qualifications of workmen: Provide sufficient skilled workmen and supervisors who shall be present at all times during execution of this portion of the Work and who shall be thoroughly familiar with the type of construction involved and the materials and techniques specified.

B. Codes and standards:

1. Wherever a test method is referenced in this section it shall be made in accordance with the most current test methods in use by the California Department of Transportation (Caltrans).
2. Where reference is made to the State Standard Specifications, reference shall mean: State of California, Business and Transportation Agency, Department of Transportation (Caltrans), Standard Specifications, 2010, excluding measurement and payment Sections.

1.3 GUARANTEES

A. The Contractor shall guarantee his Work against settlement for a period of one year after the Notice of Completion has been filed and shall repair all damage caused by settlement within that time. For the purpose of this specification, settlement will be deemed to have occurred if the following conditions exist:
1. Along unpaved portions, a depression of 1 inch below the average of the sides of the uncut portion shall be deemed a settlement.
2. In paved areas, the depression of 1/4 inch below the average of the sides of the uncut portion will be deemed a settlement.

1.4 CONTRACTOR SUBMITTALS

A. Submit all product data, shop drawings, laboratory test results, material source information, and certificates of compliance listed in this Section under a single submittal cover for review. Incomplete submittals will not be reviewed.

B. The Contractor's attention is directed to the provisions for "Shoring and Bracing Drawings" in Section 6705 of the California Labor Code. The Contractor, prior to beginning any trench or structure excavation five (5) feet deep or over, shall submit to the Engineer for review for compliance with Section 6705 the Contractor's detailed plan showing design of all shoring, bracing, sloping of the sides of excavation, or other provisions for worker protection against the hazard of caving ground during the excavation of such trenches or structure excavation. If such plan varies from the shoring system standards established in the Construction Safety Orders of the State of California, such alternative system plans shall be prepared, stamped and signed by a civil or structural engineer licensed in the State of California at the Contractor's expense.

C. Certificates of Compliance: Certificates of Compliance shall be provided for all products and materials proposed to be used under this Section.

D. For all materials, the Contractor shall designate the source and/or submit samples of all materials in advance of their use for required testing and Engineer's approval, if requested. All testing costs shall be at the District's expense.

1.5 QUALITY ASSURANCE

A. General: All soils testing will be performed by the District.

B. Where soil material is required to be compacted to a percentage of maximum density the maximum density at optimum moisture content will be determined in accordance with the standards outlined ASTM D1557. Field density in-place tests will be performed by the District.

C. The Contractor shall notify the Engineer at least 2 working days prior to performing any utility excavation.

PART 2 PRODUCTS

2.1 EXCAVATION

A. The Contractor shall complete all excavation regardless of type, nature, or condition of the material encountered. The Contractor shall make his own estimate of the kind and extent of the various materials to be excavated in order to accomplish the Work. The Contractor should refer to the available Geotechnical Engineering Investigation report (soils report) for anticipated excavation conditions. Native backfill shall not be used for any utility trench backfill, unless noted otherwise on the Drawings.

2.2 BEDDING AND COVER MATERIAL

A. Pipe Bedding Material: Section 02200, “Earthwork.”

2.3 TRENCH BACKFILL

A. Trench Backfill Material: Section 02200, “Earthwork.”

2.4 PERMEABLE MATERIAL

A. Permeable Material: Section 02200, "Earthwork."

B. Permeable material shall be used in over-excavated areas of trenches, including where the bottom of excavations is unstable, disturbed or wet.

2.5 GEOTEXTILE FABRICS

A. Filter Fabric: Section 02200, "Earthwork."

B. Subgrade Stabilization Fabric: Section 02200, "Earthwork."

2.6 STEEL PLATE

A. When steel plate bridging is provided in lieu of backfill and temporary asphalt, it shall conform to Section 602.1 of the Caltrans Encroachment Permit Manual, with the following minimum thicknesses:

Trench Width	Minimum Plate Thickness
(10") 0.25 m	(1/2") 13 mm
(1' – 11") 0.58 m	(3/4") 19 mm
(2' – 7") 0.80 m	(7/8") 22 mm
(3' – 5") 1.04 m	(1") 25 mm
(5' – 3") 1.60 m	(1 ¼") 32 mm

B. For spans greater than 5 feet-3 inches, a structural design shall be prepared by a California registered civil engineer.

C. Plates to be coated with a "no slip" surface.

PART 3 EXECUTION

3.1 GENERAL

A. The Contractor shall perform all excavation of whatever substance is encountered to the lines and grades shown on the plans. All excavated materials shall become the property of the Contractor and disposed of in accordance with local and state requirements.

B. Not more than 300 feet of excavation trench will remain unbackfilled at the end of each day of Work. The maximum amount of open trench permitted in any one location shall be the length necessary to accommodate the amount of pipe installed and backfilled in a single day. All trenches shall be fully backfilled at the end of each day or, in lieu thereof, shall be covered by heavy steel plates adequately braced and capable of supporting vehicular traffic in those locations where it is impractical to backfill at the end of each day. The above requirements for backfilling or use of steel plate may be waived in cases where the trench is located further than 100 feet from any traveled roadway or occupied structure. In such cases, however, barricades and warning lights meeting safety requirements shall be provided and maintained. All operations shall be carried out in an orderly fashion. Backfilling, compacting, base, and cleanup will be accomplished as sections of the pipe are installed.

C. Where abandoned underground structures are encountered, remove to sufficient depth to allow underground lines to cross, backfill and compact during rough grading. The Engineer may require further work to be done if visual inspection indicates during construction.

3.2 WIDTH OF TRENCH

A. Except where otherwise specifically noted or directed, excavation for pipelines and utilities shall be open-cut trenches, sides of trenches shall be vertical, shored as required, and shall be uniform width from top to bottom. Trenches shall be of a width as shown on the Drawings.

B. If trench widths exceed those shown on the Drawings, install all additional stabilization material, special bedding and cover, backfill, base and paving or higher strength pipe in

conformance with these specifications and as directed by the Engineer at no additional cost to the District.

C. Subgrade: The surface of the subgrade after compaction shall be hard, uniform, smooth, self- draining, and true to grade and cross section.

D. Trench Bottom: The pipe bedding shall be given a final trim establishing grade such that each pipe section when first laid will be continually in contact with the bedding along the extreme bottom of the pipe. Rounding out the trench bottom or bedding to form a cradle for the pipe will not be allowed. The Contractor shall hand excavate for bell holes and fittings.

3.3 PAVING REMOVAL

A. Pavement removed for trenching shall be recycled at an approved facility.

3.4 REMOVAL OF WATER

A. Water disposal shall meet federal, state, and local requirements.

3.5 SHORING, SHEETING AND BRACING

A. See Section 02160 - Shoring and Trench Safety. The Contractor shall furnish and install all shoring, sheeting and bracing required to support adjacent earth banks and structures for the protection and safety of all personnel working in the trench. All shoring, sheeting and bracing shall conform to the requirements of the State or local agents having jurisdiction over such matters. Remove shoring, sheeting and bracing in a manner that will protect the workman and prevent caving of banks and damage to the pipe, grade, sidewall support, bedding compaction, excavation, backfill or adjacent property.

3.6 OVER-EXCAVATION

A. If the bottom of an excavation is found to consist of soft or unstable material that is incapable of properly supporting the pipe or structure, the Engineer shall be advised immediately.

B. The Contractor shall obtain the Engineer's approval prior to performing any over-excavation. Any over-excavating and resultant backfill and compaction without such approval shall be at the Contractor's expense. The quantity of approved unsuitable material excavated and its replacement shall be paid for as extra work only with the authorization of the Engineer and in accordance with the Contract Documents.

3.7 ROCK EXCAVATION

A. Rock excavation shall include removal and disposal of the following: (1) all boulders measuring 1/3 of a cubic yard or more in volume; (2) all rock material in ledges, bedding deposits, and unstratified masses; (3) concrete or masonry structures which have been abandoned; and (4) conglomerate deposits which are so firmly cemented that they possess the characteristics of solid rock.

B. The Contractor shall obtain the Engineer's approval prior to performing any rock excavation. Any rock excavation and resultant backfill and compaction without such approval shall be at the Contractor's expense. The quantity of approved rock excavated and its replacement with suitable fill material shall be paid for as extra work only with the authorization of the Engineer and in accordance with the Contract Documents.

C. Rock excavation is not anticipated for this project. If the Contractor encounters rocks during earthwork activities, the Engineer shall be advised immediately.

D. Explosives and Blasting: Use of Explosives and Blasting will not be permitted.

3.8 TRENCH BACKFILL IN THE PIPE ZONE

A. The Contractor shall backfill the pipe zone with the bedding and cover materials specified to the dimensions shown on the Drawings. The trench shall be final-graded by hand to provide a secure bedding full length with hand excavation made for bells or collars.

B. Trench backfill in the pipe zone shall be moisture conditioned to within 2 percent of the ASTM D1557 optimum moisture content and compacted to achieve a minimum relative compaction of 90 percent of the ASTM D1557 maximum dry density, unless noted otherwise on the Drawings.

C. Additional backfill shall then be installed and the sides of the pipes moisture conditioned to within 2 percent of the ASTM D1557 optimum moisture content. Backfill on the sides of the pipe shall be shovel sliced to remove voids and tamped to not less than 90 percent compaction to secure full- length bedding and proper pipe wall support. After this, cover material shall be added and mechanically compacted to a relative compaction not less than 90 percent.

3.9 TRENCH BACKFILL IN THE TRENCH ZONE

A. The Contractor shall backfill the trench zone with the trench cover materials specified to the dimensions shown on the Drawings. The trench shall be final-graded by hand to provide a secure bedding full length with hand excavation made for bells or collars.

B. Trench backfill in the trench zone shall be moisture conditioned to within 2 percent of the ASTM D1557 optimum moisture content, placed in maximum 8 inch thick loose lifts prior to compacting, and compacted to achieve a minimum relative compaction of 95 percent of the ASTM D1557 maximum dry density.

C. Trench backfill within 12 inches of subgrade in non-vehicular areas shall be moisture conditioned to within 2 percent of the ASTM D1557 optimum moisture content, placed in maximum 6 inch thick loose lifts prior to compacting, and compacted to achieve a minimum relative compaction of 95 percent of the ASTM D1557 maximum dry density.

D. Trench backfill within 12 inches of subgrade in vehicular areas shall be moisture conditioned to within 2 percent of the ASTM D1557 optimum moisture content, placed in maximum 6 inch thick loose lifts prior to compacting, and compacted to achieve a minimum relative compaction of 95 percent of the ASTM D1557 maximum dry density.

3.10 PLACING AND SPREADING OF BACKFILL MATERIALS

A. Backfill shall not be dropped directly upon any structure or pipe. Backfill shall not be placed around nor upon any structure for a minimum of 72 hours or until the concrete has attained sufficient design strength to withstand the loads imposed, whichever is greater.

B. Backfill materials shall be placed and spread evenly in horizontal layers.

C. During spreading each layer shall be thoroughly mixed as necessary to promote uniformity of material in each layer and uniformity of moisture throughout backfill materials. Pipe Zone backfill materials shall be manually spread around the pipe so that when compacted, the Pipe Zone backfill will provide uniform bearing and side support.

D. Where the backfill material moisture content is below the optimum moisture content water shall be added before or during spreading until the proper moisture content is achieved.

E. Where the backfill material moisture content is too high to permit the specified degree of compaction, the material shall be dried or replaced until the moisture content is satisfactory.

F. Backfill shall be mechanically compacted by means of tamping rollers, sheepsfoot rollers, pneumatic tire roller, vibrating rollers, or other mechanical tampers. All such equipment shall be of a size and type subject to review by the Engineer. Impact-type pavement breakers (stompers) will not be permitted. Permission to use specific compaction equipment shall not be construed as guaranteeing or implying that the use of such equipment will not result in damage to adjacent ground, existing improvements, or new improvements. The Contractor shall make its own determination in this regard.

G. Material for mechanically compacted backfill shall be placed in lifts which, prior to compaction, shall not exceed the thickness specified below for various types of equipment:
   1. Vibratory equipment, including vibratory plates, vibratory smooth-wheel rollers, and vibratory pneumatic-tired rollers - maximum lift thickness of 1 foot.
   2. Rolling equipment, including sheepsfoot (both vibratory and non-vibratory), grid, smooth- wheel (non-vibratory), pneumatic-tired (non-vibratory), and segmented wheels - maximum lift thickness of 1 foot.
   3. Hand-directed mechanical tampers-maximum lift thickness of 4 inches.

H. Mechanically compacted landfill shall be placed in horizontal layers of thickness not exceeding those specified above, compatible to the material being placed and the type of equipment being used. Each layer shall be evenly spread, moistened or dried, if necessary, and then tamped or rolled until the specified relative compaction has been attained.

3.11 COMPACTION OF BACKFILL MATERIALS

A. Specification Section 02200 - Earthwork. Each layer of backfill material as defined herein, shall be mechanically compacted to the specified percentage of maximum density. Equipment that is consistently capable of achieving the required degree of compaction shall be used and each layer shall be compacted over its entire area while the material is at the required moisture content range.

B. Flooding, ponding, or jetting shall not be used.

C. Equipment weighing more than 10,000 pounds shall not be used closer to structure walls than a horizontal distance equal to the depth of the fill against the structure wall at that time or 5-feet, whichever is greater. Hand operated power compaction equipment shall be used where use of heavier equipment is impractical or restricted due to weight limitations.

D. Trench Backfill Requirements: The pipe class has been structurally designed based upon the trench configuration specified herein.
   1. The Contractor shall maintain the specified trench width up to a horizontal plane lying 12 inches above the top of the pipe.
   2. If, at any location under said horizontal plane, the Contractor slopes the trench walls or exceeds the maximum trench widths indicated the Pipe Zone backfill shall be "improved" or the pipe class improved at no additional cost to the District. "Improved" backfill shall mean Slurry Cement Backfill or other equivalent materials acceptable to the Engineer.
   3. All trenches shall have a minimum of 2 inches of temporary asphalt placed daily and maintained unless final paving can be completed in the same day. Temporary asphalt shall be placed flush with adjacent pavement grade.
   4. Steel plates may be used to cover open trenches in-lieu of backfill and temporary asphalt pavement.

3.12 COMMUNICATIONS/ELECTRICAL

A. Bed and backfill in accordance with the Drawings.

3.13 STEEL PLATE

A. General: When backfilling operations of an excavation in the traveled way, whether transverse or longitudinal, cannot be properly completed within a work day, steel plate bridging with a non-skid surface and shoring may be required to preserve unobstructed traffic flow.

B. Steel plate bridging and shoring shall be installed using either Method (1) or (2):
   1. Method 1 for speeds more than 45 mph:
   2. The pavement shall be cold planed to a depth equal of the thickness of the plate and to a width and length equal to the dimensions of the plate.
   3. Method 2 for speeds 45 mph or less:
      a. Approaching plate(s) and ending plate (if longitudinal placement) shall be attached to the roadway by a minimum of 2 dowels pre-drilled into the corners of the plate and drilled 2 inches into the pavement. Subsequent plates are butted to each other. Fine graded asphalt concrete shall be compacted to form ramps, maximum slope 8.5 percent with a minimum 12 inch taper to cover all edges of the steel plates. When steel plates are removed, the dowel holes in the pavement shall be backfilled with either graded fines of asphalt concrete mix, concrete slurry or an equivalent slurry.

C. When steel plate bridging is required, the following conditions shall apply:
   1. Steel plates used for bridging must extend a minimum of 12 inches beyond the edges of the trench.
   2. Steel plate bridging shall be installed to operate with minimum noise.

3. The trench shall be adequately shored to support the bridging and traffic loads.
4. Temporary paving with cold asphalt concrete shall be used to feather the edges of the plates, if plate installation by Method (2) is used.
5. Bridging shall be secured against displacement by using adjustable cleats, shims or other devices.

D. Steel plate bridging and shoring shall be installed using either Method (1) or (2):

1. Method 1 for speeds more than 45 mph:
   a. The pavement shall be cold planed to a depth equal of the thickness of the plate and to a width and length equal to the dimensions of the plate.
2. Method 2 for speeds 45 mph or less:
   a. Approaching plate(s) and ending plate (if longitudinal placement) shall be attached to the roadway by a minimum of 2 dowels pre-drilled into the corners of the plate and drilled 2 inches into the pavement. Subsequent plates are butted to each other. Fine graded asphalt concrete shall be compacted to form ramps, maximum slope 8.5 percent with a minimum 12 inch taper to cover all edges of the steel plates. When steel plates are removed, the dowel holes in the pavement shall be backfilled with either graded fines of asphalt concrete mix, concrete slurry or an equivalent slurry.

E. Steel plate bridging should not exceed 4 consecutive working days in any given week.

3.14 TESTING

A. Relative compaction shall be to the densities specified and referenced herein. All testing will be performed by the District.

END OF SECTION

SECTION 03050

BASIC CONCRETE MATERIALS AND METHODS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Formwork.
   2. Reinforcement.
   3. Accessories.
   4. Cast-in-place concrete.
   5. Non-shrink grout.
   6. Finishing and curing.

1.2 SYSTEM DESCRIPTION

A. Design, engineer and construct formwork, shoring and bracing in accordance with ACI 301 to conform to design and applicable code requirements to achieve concrete shape, line and dimension.

1.3 SUBMITTALS

A. Submit all product data, shop drawings, laboratory test results, material source information, and certificates of compliance listed in this Section under a single submittal cover for review. Incomplete submittals will not be reviewed.

B. Shop Drawings:
   1. Indicate pertinent dimensioning, form materials, arrangement of joints and ties, location of bracing and temporary supports, schedule of erection and stripping.
      a. Signed and sealed by professional engineer licensed in the State of California.
   2. Indicate reinforcement sizes, spacings, locations, and quantities, bending and cutting schedules, supporting and spacing devices.
   3. Indicate slabs-on-grade.
   4. Indicate penetrations and embedded objects.

C. Product Data: Indicate admixtures, anchors, aggregate, and vapor retarder.

D. Design Data:
   1. Submit concrete mix design for each concrete strength. Submit separate mix designs when admixtures are required for the following:
      a. Hot and cold weather concrete work.
      b. Air entrained concrete work.
   2. Identify mix ingredients and proportions, including admixtures.
   3. Identify chloride content of admixtures and whether or not chloride was added during manufacture.

E. Submit test data on materials used for concrete and mixture proportions.
   1. Qualification of proposed materials and establishment of concrete mixtures including compressive strength test results for each mix design indicating concrete performance throughout the specified slump tolerances.

F. Repair Procedures: Submit repair methods and materials.

1.4 QUALITY ASSURANCE

A. Construct and erect concrete formwork in accordance with ACI 301.

B. Perform concrete reinforcing work in accordance with ACI 301.

C. Perform cast-in-place concrete work in accordance with ACI 301.

D. Sustainable Design Requirements:
   1. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.

E. Perform Work in accordance with State of California standards.

F. Maintain one copy of each document on site.

G. Design Work under direct supervision of Professional Civil or Structural Engineer experienced in design of this Work and licensed in State of California.

PART 2 PRODUCTS

2.1 FORM MATERIALS

A. Form Materials: At discretion of Contractor.

2.2 REINFORCEMENT MATERIALS

A. Reinforcing Steel: ASTM A615/A615M, 60 ksi yield grade, deformed billet bars, uncoated.

B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for support of reinforcing; plastic tipped or non-corroding supports are exposed to weather.

C. Fabricate concrete reinforcement in accordance with ACI 301.

D. Do Not Weld reinforcement.

2.3 CONCRETE MATERIALS

A. Cement: ASTM C150, Type II Portland type.

B. Fine and Coarse Aggregates: ASTM C33.

C. Water: Clean and not detrimental to concrete.

D. Air Entrainment Admixture: ASTM C260.

E. Bonding Agent: Epoxy Type.

F. Non-shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.

2.4 COMPOUNDS, HARDENERS AND SEALERS

A. Curing Compound: ASTM C309, Type 1 Class B.

2.5 CONCRETE MIX

A. Mix and deliver concrete in accordance with ASTM C94/C94M, Option A.

B. Furnish concrete of the following strength:
1. Compressive strength 4,000 psi (28 day).
2. Slump 1 to 4 inches.
3. Maximum water-cement ratio: 0.48.

C. Select admixture proportions for normal weight concrete in accordance with ACI 301.

D. Add air entraining agent to concrete mix for concrete work exposed to exterior.

PART 3 EXECUTION

3.1 FORMWORK ERECTION

A. Erect formwork, shoring and bracing to achieve design requirements.

B. Camber slabs and framing to achieve ACI 301 tolerances.

C. Provide bracing to ensure stability of formwork.

D. Form external corners of equipment pad with 1inch chamfer.

E. Apply form release agent to formwork prior to placing form accessories and reinforcement.

F. Clean forms as erection proceeds, to remove foreign matter.

3.2 INSERTS, EMBEDDED COMPONENTS, AND OPENINGS

A. Provide formed openings where required for work to be embedded in and passing through concrete members.

B. Coordinate work of other sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors, and other inserts.

C. Install concrete accessories straight, level, and plumb.

D. Place formed construction joint device in pattern pouring sequence.

3.3 REINFORCEMENT PLACEMENT

A. Place reinforcement, supported and secured against displacement.

B. Ensure reinforcing is clean, free of loose scale, dirt, or other foreign coatings.

C. Space reinforcement bars with minimum clear spacing in accordance with ACI 301.
   1. Where bars are indicated in multiple layers, place upper bars directly above lower bars.

D. Maintain concrete cover around reinforcement in accordance with ACI 350.

3.4 PLACING CONCRETE

A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent.

B. Separate slabs-on-grade from vertical surfaces with ¼ inch thick joint filler, extended from bottom of slab to within ¼ inch of finished slab surface.

C. Place concrete continuously between predetermined expansion, control and construction joints.

3.5 FORM REMOVAL

A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.

B. Remove formwork progressively and in accordance with code requirements.

3.6 FLOOR FINISHING

A. Finish concrete floor surfaces in accordance with ACI 301.

B. Uniformly spread, screed, and float concrete.

C. Maintain surface flatness, with maximum variation of 1/8 inch in 10 ft.

D. Coat finished concrete in accordance with 09 90 00 - Painting and Coating

3.7 CURING AND PROTECTION

A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
   1. Protect concrete footings from freezing for minimum 5 days.

B. Immediately after placement, protect concrete from premature drying.

C. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete for not less than 7 days.
   1. Fill concrete backwash tank completely with water during curing process.

3.8 FORMED SURFACES

A. Provide concrete surfaces to be left exposed with smooth rubbed finish.

3.9 ERECTION TOLERANCES

A. Install reinforcement within tolerances required by ACI 301.

3.10 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with ACI 301.

B. Perform tightness testing on concrete backwash tank in accordance with ACI 350.1.

C. Reinforcement Inspection:

1. Inspect for correct materials, fabrication, sizes, locations, spacing, concrete cover, and splicing.

D. Strength Test Samples:
1. Sample concrete and make one set of three cylinders for every 150 cu yds or less of each class of concrete placed each day and for every 5,000 sf of surface area for slabs and walls.

E. Field Testing:
1. Measure slump and temperature for each compressive strength concrete sample.
2. Measure air content in air entrained concrete for each compressive strength concrete sample.

F. Cylinder Compressive Strength Testing:
1. Test Method: ASTM C39/C39M.
2. Test Acceptance: In accordance with ACI 301.
3. Test two cylinders at 28 days.
4. Retain one cylinder for testing when requested by Architect/Engineer.
5. Dispose remaining cylinders when testing is not required.

3.11 DEFECTIVE CONCRETE

A. Modify or replace concrete not conforming to required lines, details and elevations, as directed by Architect/Engineer.

END OF SECTION

SECTION 09900

PAINTS AND COATINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Surface preparation and field application of protective coatings for ductile iron pipe and fittings.

1.2 DEFINITIONS

A. Exposed Metal - Mildly Corrosive: Exposed metal surfaces, except aluminum or stainless steel, located inside or outside of structures and exposed to weather or highly humid atmosphere, such as ARV and blow-off vaults, similar areas, and where indicated.

B. Exposed Metal – Atmospheric: Exposed metal surfaces located inside or outside of structures and exposed to weather, including metal hatches and frames, vents, pipe supports, sheet metalwork, and miscellaneous metal fabrications.

C. Exposed Metal - Interior: Exposed metal surfaces, except aluminum or stainless steel, located inside structures and not exposed to weather or highly humid atmosphere.

1.3 REFERENCES

A. ASTM D638 - Tensile Properties of Plastics.

B. ASTM D790 - Flexural Properties of Unreinforced and Reinforced Plastics.

C. ASTM D695 - Compressive Properties of Rigid Plastics.

D. ASTM D4541 - Pull-off Strength of Coatings Using a Portable Adhesion Tester.

E. ASTM D2584 - Volatile Matter Content.

F. ASTM D2240 - Durometer Hardness, Type D.

G. ASTM D543 - Resistance of Plastics to Chemical Reagents.

H. ASTM C109 - Compressive Strength Hydraulic Cement Mortars.

I. ACI 506.2-77 - Specifications for Materials, Proportioning, and Application of Shotcrete.

J. ASTM C579 - Compressive Strength of Chemically Setting Silicate and Silica Chemical Resistant Mortars.

K. ASTM - The published standards of the American Society for Testing and Materials, West Conshohocken, PA.

L. NACE - The published standards of National Association of Corrosion Engineers (NACE International), Houston, TX.

M. SSPC - The published standards of the Society of Protective Coatings, Pittsburgh, PA.

N. SSPWC 210-2.3.3 - Chemical resistance testing published in the Standard Specifications for Public Works Construction, 1997 edition (otherwise known as "The Greenbook").

O. NSF/ANSI 61 – Drinking Water System Components

1.4 ABBREVIATIONS

A. MDFT: Minimum Dry Film Thickness

B. MDFTPC: Minimum Dry Film Thickness Per Coat

C. Mil: Thousandths of an inch

D. SFPG: Square Feet Per Gallon

E. SFPGPC: Square Feet Per Gallon per Coat

1.5 SUBMITTALS

A. Technical data sheet on each product used, including ASTM test results indicating the product conforms to and is suitable for its intended use per these specifications.

B. Product Data: Provide data on all finishing products including but not limited to Paint System Data Sheet (PSDS), Material Safety Data Sheets (MSDS), Technical Data Sheets and paint colors available for each product used for each coating system.

C. Project specific guidelines and recommendations.

D. Manufacturer's Instructions: Indicate special surface preparation procedures, substrate conditions requiring special attention.

E. Applicator Qualifications:
1. Manufacturer certification that Applicator has been trained and approved in the handling, mixing and application of the products to be used. Letter of certification shall be current and validated by manufacturer with a date to reflect specific bid or proposal submittal.
2. Certification that the equipment to be used for applying the products has been manufactured or approved by the epoxy coating manufacturer and Applicator personnel have been trained and certified for proper use of the equipment.

3. Five (5) recent references of Applicator indicating successful application of a high-build solvent-free epoxy coating by plural component spray application.
4. Proof of any required federal, state or local permits or licenses necessary for the project.

1.6 QUALITY ASSURANCE

A. Applicator shall initiate and enforce quality control procedures consistent with applicable ASTM, NACE and SSPC standards and the epoxy coating manufacturer's recommendations.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container label to include manufacturer's name, type of coating, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Store coating materials according to their material safety data sheets at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions. Products are to be kept dry, protected from weather and stored under cover.

D. Handle products according to their material safety data sheets.

1.8 REGULATORY REQUIREMENTS

A. Conform to federal, state, and local requirements limiting the emission of volatile organic chemicals (VOC). Specific requirements may be secured through local office of Air Pollution Control Officer.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Do not apply exterior coatings during rain or snow.

C. Air and surface temperature must be above 50 degrees F and at least 5 degrees F above the dew point and below 110 degrees F. Humidity must not exceed 85 percent.

D. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

1.10 SITE CONDITIONS

A. Applicator shall conform with all local, state and federal regulations including those set forth by OSHA, RCRA and the EPA and any other applicable authorities.

1.11 WARRANTY

A. Applicator shall warrant all work against defects in materials and workmanship for a period of one (1) year, unless otherwise noted, from the date of final acceptance of the project. Applicator shall, within a reasonable time after receipt of written notice thereof, repair defects in materials or workmanship which may develop during said one (1) year period, and any damage to other work caused by such defects or the repairing of same, at his own expense and without cost to the District.

PART 2 PRODUCTS

2.1 GENERAL

A. All materials of a paint system shall be produced by the same manufacturer. Thinners, cleaners, driers, and other additives shall be as recommended by the manufacturer of the particular coating.

2.2 MANUFACTURERS

A. Heavy-Duty Industrial Coatings
1. Tnemec Company
2. Ameron
3. Valspar
4. Approved equal.

B. Wax Tape Wrap and Wax Tape Primer
1. The Trenton Corporation
2. Denso North America Inc.
3. Approved equal.

2.3 COATING MATERIALS

A. Paint products are specified in the following table. Products are referred to by code in the Coating Application Schedule.

CODE	PRODUCT	DESCRIPTION
AP	Aromatic Polyurethane	Moisture cured, Mio-zinc filled primer
CBF	Cementitious Block Filler	Multiple-component, water-based, cementitious acrylic
CE	Catalyzed Epoxy	Multiple purpose, two component epoxy suitable for immersion service system and as a prime coat for metal and galvanized surfaces

EF	Modified Polyamine Epoxy	100% volume solids epoxy, thin film flooring
GRE	Glass Reinforced Epoxy	100% solids, glass reinforced epoxy
MTE	Moisture Tolerant Epoxy	100% solids penetrating epoxy
PE	Polyurethane Enamel	High-gloss or high semi-gloss, aliphatic polyurethane enamel
WBAE	Water-based Acrylic Epoxy	Non-yellowing, low odor, acrylic epoxy wall coating
WP	Water Based Polyurethane	High-gloss or high semi-gloss, water-based acrylic polyurethane

CODE	PRODUCT	DESCRIPTION
WT	Wax Tape Wrap	Plastic-fiber felt, saturated with a blend of microcrystalline waxes, plasticizers and corrosion inhibitors, forming a tape
WTP	Wax Tape Priming Paste	High temperature petrolatum wax coating compound that will not melt and can be applied at ambient temperatures up to 200 degrees F
ZRP	Organic Zinc Rich Primer	Converted epoxy, or urethane type, minimum 14 lb. metallic zinc content per

2.4 COLORS

A. Colors: Provide premium color palette. Color shall be selected by District.

B. Use colorants free of lead, lead compounds, or other materials which might be affected by the presence of hydrogen sulfide or other gases likely to be present at the project.

C. Proprietary identification of colors is for identification only. Any authorized manufacturer may supply matching color.

2.5 TESTING GAUGES

A. Furnish a magnetic type dry film thickness gauge, to test coating thickness specified in mils. Unit to be as recommended by the coating manufacturer.

B. Furnish an electrical holiday detector, low voltage, wet sponge type to test finish coat, except zinc primer, high-build elastomeric coatings, and galvanizing, for holidays and discontinuities. Unit to be as recommended by the coating manufacturer.

C. Furnish a high voltage holiday detector for elastomeric coatings in excess of 25 mils dry film thickness. Unit to be as recommended by the coating manufacturer.

PART 3 EXECUTION

3.1 GENERAL

A. Surface Preparation Inspection:
   1. Inspect and provide substrate surfaces prepared in accordance with these Specifications and the printed directions and recommendations of paint or coating manufacturer whose product is to be applied. In the event of a conflict, the more stringent shall apply.

B. For coatings subject to immersion, obtain full cure for completed system. Consult coatings manufacturer's written instructions for these requirements. Do not immerse coating for any purpose until completion of curing cycle.

C. The intent of these Specifications is for concrete and metal surfaces to be painted, whether specifically mentioned or not, except as modified herein. Concealed structural steel surfaces shall receive prime coat only unless modified herein.

3.2 MANUFACTURER'SSERVICES

A. Paint or coating manufacturer's representative shall be present at site as required to resolve field problems attributable to, or associated with the manufacturer's product.

3.3 SURFACES NOT REQUIRING PAINTING

A. Unless otherwise specified or indicated on Drawings, do not paint the following items:
   1. Exterior concrete and masonry surfaces.
   2. Nonferrous and corrosion-resistant ferrous alloys such as copper, bronze, monel, aluminum, chromium plate, and stainless steel, except where:
      a. Required for electrical insulation between dissimilar metals.
      b. Aluminum and stainless steel are embedded in concrete or masonry, or aluminum is in contact with concrete or masonry.
      c. Color coding of equipment and piping is required.
   3. Nonmetallic materials (not including wood) such as glass, PVC, porcelain, and plastic (FRP) except as required for architectural painting or color coding.
   4. Prefinished electrical and architectural items such as motor control centers, switchboards, switchgear, panelboards, transformers, disconnect switches, acoustical tile, cabinets, building louvers, wall panels, etc., unless color coding of equipment is required.
   5. Nonsubmerged electrical conduits attached to unpainted concrete surfaces.
   6. Items specified to be galvanized after fabrication unless specifically noted or subject to immersion. Manufactured items and materials that are "factory" galvanized shall be prepared and coated as specified hereinafter for the exposure condition of the item and for architectural purposes unless otherwise specified herein. Repair of damaged galvanized surfaces is required.

3.4 PROTECTION OF SURFACES NOT TO BE PAINTED

A. Protect all surfaces adjacent to, or downwind of work area from overspray. Contractor shall be responsible for any damage resulting from overspray.

B. Remove, mask, or otherwise protect hardware, lighting fixtures, switch plates, aluminum surfaces, machined surfaces, couplings, shafts, bearings, nameplates on machinery, and other surfaces not intended to be painted.

C. Provide drop cloths to prevent paint materials from falling on or marring adjacent surfaces.

D. Protect working parts of mechanical and electrical equipment from damage during surface preparation and painting process.

E. Mask openings in motors to prevent paint and other materials from entering.

3.5 APPLICATION SAFETY

A. Perform painting in accordance with recommendations of the following:
1. Paint manufacturer's instructions.

2. Federal, state, and local agencies having jurisdiction.

B. Contractor will be solely and completely responsible for conditions of the jobsite, including safety of all persons (including employees) and property during performance of the work. This requirement will apply continuously and not be limited to normal working hours. Safety provisions will conform to U.S. Department of Labor, Occupational Safety and Health Act, any equivalent state law, and all other applicable federal, state, county, and local laws, ordinances, and codes.

C. Contractor will comply with all safety training requirements promulgated or required for this project.

3.6 MIXING

A. Prepare and mix paint and coatings in accordance with manufacturer's instructions.

B. Prepare multiple-component coatings using all of the contents of the container for each component as packaged by the manufacturer. No partial batches will be permitted. Do not use multiple-component coatings that have been mixed beyond their pot life. Provide small quantity kits for touch-up coating and other small areas. Mix only the components specified and furnished by the manufacturer. Do not intermix additional components for reasons of color or otherwise, even within the same generic type of coating.

C. Keep coating materials sealed when not in use.

D. Alternate colors to provide a visual reference where more than one coat of a material is applied within a given system.

3.7 PREPARATION

A. Metal Surfaces

1. Remove oil, grease, welding flux and other surface contaminants using steam, open flame, hot water, or cold water with detergent additives followed with clean water rinsing. Small areas may be cleaned using suitable solvents.
2. Round all sharp edges and grind smooth burrs, jagged edges and surface defects.
3. Prepare welds so that there is: (a) no undercutting or reverse ridges on weld bead; (b) no weld splatter on or adjacent to weld; and (c) no sharp peaks or ridges along weld bead.
4. Prepare metal surfaces as specified in accordance with SSPC Specifications as follows:
   a. SP1 – Solvent Cleaning
   b. SP2 – Hand Tool Cleaning
   c. SP3 – Power Tool Cleaning
   d. SP5 – White Metal Blast Cleaning
   e. SP6 – Commercial Blast Cleaning
   f. SP7 – Brush-Off Blast Cleaning
   g. SP8 – Pickling
   h. SP10 – Near-White Blast Cleaning
   i. SP11 – Power Tool Cleaning to Bare Metal
   j. SP12 – High Pressure Water Jetting
5. Wherever “solvent cleaning,” “hand tool cleaning,” “wire brushing,” “blast cleaning,” or similar metal surface preparation methods are specified or used in paint manufacturer's instructions, conform to SSPC Specifications listed above.
6. Where OSHA or EPA regulations preclude standard abrasive blast cleaning, wet or vacu-blast methods may be required. Follow coatings manufacturer’s recommendations for wet blast additives and first coat application.
7. Blast Cleaning Requirements: Comply with applicable federal, state, and local, air pollution and environmental control regulations for blast cleaning and disposition of spent aggregate and debris.
8. Clean surfaces of all dust and residue from surface preparation operations by air blast cleaning or other dry method prior to painting. Paint surfaces the same day they are prepared; do not allow surfaces to rust prior to painting.

3.8 COATING APPLICATION

A. General

1. Apply coatings in accordance with manufacturer's recommendations. Allow sufficient time between coats to assure drying of previous coat.
2. Fusion bonded coatings may be applied using electrostatic, fluidized bed, or flocking method.
3. Paint units to be bolted together or to structure prior to assembly or installation.
4. Extent of Coating (Immersion): Coatings shall be applied to all internal vessel and pipe surfaces, nozzle bores, flange gasket sealing surfaces, carbon steel

internals, and stainless steel internals, unless otherwise specified.

B. Shop Primed or Factory Finished Surfaces
1. Repair chipped, peeled or abraded coatings to satisfaction of Engineer by hand or power sanding, feathering the edges, and spot priming with specified primer. Prepare and prime holdback areas for welding as required for specified paint system after welding is completed. Apply all coatings in accordance with manufacturer's instructions.
2. Remove all factory-applied bituminous or asphaltic varnishes from ductile iron pipe prior to application of specified coatings.

C. Manufacturer Applied Paint Systems: Repair abraded areas in accordance with equipment manufacturer's directions. Blend repaired areas into original finish. Provide appropriate liquid repair kits for field repair of fusion bonded coatings.

D. Film Thickness:
1. Number of Coats:
a. Minimum required irrespective of coating thickness.
b. Additional coats may be required to obtain minimum required paint thickness, depending on method of application, differences in manufacturer’s products, and atmospheric conditions.
2. Application Thickness:
a. Do not exceed coating manufacturer’s recommendations.
b. Measure using a wet film thickness gauge to ensure proper coating thickness during application.
3. Film Thickness Measurements and Electrical Inspection of Coated Surfaces:
a. Perform with properly calibrated instruments.
b. Recoat and repair as necessary for compliance with the Specifications.
c. All coats will be subject to inspection by Engineer and coating manufacturer’s representative.
4. Visually inspect concrete, nonferrous metal, plastic, and wood surfaces to ensure proper and complete coverage has been attained.
5. Give particular attention to edges, angles, flanges, and other similar areas, where insufficient film thickness are likely to be present, and ensure proper millage in these areas.
6. Apply additional coats as required to complete hiding of underlying coats. The hiding shall be so complete that the addition of additional coats would not increase the hiding.
7. Thickness Testing:
a. After repaired and recoated areas have dried sufficiently, final tests will be conducted by the Engineer.
b. Measure coating thickness specified in mils with a magnetic type dry film thickness gauge as specified.
c. Test finish coat, except zinc primer, galvanizing, and elastomeric coatings, for holidays and discontinuities with an electrical holiday detector, low voltage, wet sponge type as specified.
d. Holiday detect coatings with high voltage units when recommended by the coating manufacturer.

e. Check each coat for correct millage. Do not make measurement before a minimum of 8 hours after applications of coating.

E. Damaged Coatings, Pinholes, and Holidays:

1. Feather edges and repair in accordance with recommendations of paint manufacturer.
2. Hand or power sand visible areas of chipped, peeled, or abraded paint, and feather the edges. Follow with primer and finish coat. Depending on extent of repair and appearance, a finish sanding and topcoat may be required.
3. Repair fusion bonded coatings as recommended by original applicator. Applicator shall provide liquid repair kits for this purpose as recommended by coating manufacturer.
4. Apply finish coats, including touchup and damage-repair coats, in a manner which will present a uniform texture and color-matched appearance.

F. Unsatisfactory Application:

1. If item has improper finish color or insufficient film thickness, clean and top coat surface with specified paint material to obtain specified color and coverage. Obtain specific surface preparation information from coating manufacturer.
2. Evidence of runs, bridges, shiners, laps, or other imperfections shall be cause for rejection.
3. Repair defects in coating system per written recommendations of coating manufacturer.
4. Leave all staging up until Engineer has inspected surface or coating. Replace staging removed prior to approval by Engineer.

3.9 CLEANING

A. Collect waste material which may constitute a fire hazard, place in closed metal containers and remove daily from site.

B. Remove paint spatters from adjoining surfaces. Repair any damage to coatings or surfaces caused by cleaning operations.

3.10 COATING APPLICATION SCHEDULE

A. Unless otherwise shown or specified in these Specifications, paint or coat the work in accordance with the following application schedule. In the event of discrepancies or omissions in the following, request clarification from the Engineer before starting work in question.

APPLICATION	SURFACE PREPARATION (paragraph 3.7)	PRIMER Paint Material (paragraph 2.3), No. Coats, and Min. Cover	FINISH Paint Material (paragraph 2.3) No. Coats, and Min. Cover
Submerged Metal	SP 5	CE, 1 coat 5.0 mils	CE, 2 coats 5.0 mils, each
Exposed Metal – Mildly Corrosive	SP 10	CE, 1 coat 5.0 mils	PE, 2 coats 2.0 mils, each
Exposed Metal – Atmospheric	SP 6	CE, 1 coat 5.0 mils	PE, 2 coats 2.0 mils, each
Exposed Metal – Interior (Apply primer to all surfaces; finish coat need only be applied to surfaces exposed when construction is complete.)	SP 6 or SP 8	AP, 1 coat 2.5 mils	WP, 2 coats 2.0 mils, each coat
Buried Ductile Iron Pipe and Fittings	Manufacturer's Applied Coating	WTP, 4.25 gallons per 100 LF of 16-inch	WT, 1 layer with 1" minimum overlap,
Galvanized surfaces requiring painting.	SP 1 followed by ASTM D6386	CE, 1 coat 3.0 mils	PE, 1 coat 2.5 mils
Repair of galvanized metal	SP 1 followed by SP 2, or ASTM D6386	none	ZRP, 1 coat 2.5 mils
Interior concrete and cement grout surfaces in buried structures.	Concrete	MTE, 1 coat 4.0 mils	GRE, 1 coat 50.0 mils
Aluminum and cementitious or dissimilar metal	SP 1	CE, 1 coat 5.0 mils	CE, 1 coat 5.0 mils

END OF SECTION

SECTION 11310

SANITARY PUMP STATION

PART 1 - GENERAL

1.1 SUMMARY

A. Work under this Section includes installation of the pre-purchased pump system as dictated by the manufacturer's specifications included in APPENDIX B.

1.2 REFERENCE STANDARDS

A. The work in this section is subject to the requirements of applicable portions of the following standards:

1. ABMA – American Bearing Manufacturers Association
2. ANSI – American National Standards Institute
3. ASME – American Society of Mechanical Engineers
4. ASTM – American Society for Testing and Materials
5. IEEE – Institute of Electrical and Electronics Engineers
6. ISO – International Organization for Standardization
7. NEMA – National Electrical Manufacturers Association
8. NFPA – National Fire Protection Agency
9. UBC – Uniform Building Code
10. UL – Underwriters Laboratories, Inc., UL 788 Motor Operated Water Pumps, UL 508 Industrial Control Panels
11. UMC – Uniform Mechanical Code, California Code of Regulations Title 8
12. UPC – Uniform Plumbing Code

PART 3 - EXECUTION

3.1 INSTALLATION

A. Contractor shall install all pumps, controls and associated appurtenances in accordance with the manufacturer's recommended procedures, instructions and shop drawings, as accepted by the Engineer.

3.2 FIELD QUALITY CONTROL

A. Supplier shall provide start up services to the selected Contractor for pump installation.

B. Pre-operational Check: Before operating system or components, make the following checks:

1. Check for proper motor rotation.
2. Check pump and drive units for proper lubrication.

C. Verify pump performance by performing time/draw down test or time/fill test.

D. Check pump and motor for high bearing temperature and excessive vibration. Check for motor overload by taking ampere readings.

E. Equipment Acceptance:

1. Adjust, repair, modify, or replace system components that fail to perform as specified and rerun tests. Make final adjustments to equipment under direction of manufacturer's representative.

2. Document adjustments, repairs and replacements in manufacturer's field services certification.

3.3 SYSTEM START-UP

A. Provide Manufacturer qualified factory trained field service engineer services for an 8-hour working day at the site for each pair of pumps to inspect the installation, perform equipment testing, calibration, and start-up on the products being supplied (motor, cable and pump, control panel).

B. Prior to start-up, all equipment shall be inspected for proper alignment, quiet operation, proper connection, and satisfactory performance. The manufacturer's authorized representative shall inspect the completed installation and provide written certification to the Engineer that the equipment has been installed in accordance with the manufacturer's recommended method, is operating properly and is ready for service.

C. After the pumps have been completely installed and wired, the Contractor shall have the manufacturer do the following:

1. Megger stator and power cables.

2. Test resistance of motor windings.

3. Check seal lubrication.

4. Check for proper rotation.

5. Check power supply voltage.

6. Measure motor operating load and no load current.

7. Check level control operation and sequence.

D. Demonstrate equipment start up, shutdown, routine maintenance, alarm condition responses, and emergency repair procedures to District's personnel.

E. During this initial inspection, the Manufacturer's service representative shall review recommended operation and maintenance procedures with the District's personnel.

3.4 FUNCTIONAL TESTING OF INSTALLED EQUIPMENT

A. Coordinate with the manufacturer's representative and the Installer on the necessary fluids, utilities, temporary piping, temporary supports, temporary access platforms or access means and other temporary facilities and labor necessary to safely operate the equipment and accomplish the specified testing.

B. Submit test plan. Indicate test start time and duration, equipment to be tested, other equipment involved or required; temporary facilities required, number and skill or trade of personnel involved; safety issues and planned safety contingencies; anticipated effect on OWNER's existing equipment and other information relevant to the test.

C. Prior to testing, the manufacturer's representative shall verify equipment protective devices and safety devices have been installed, calibrated, and tested.

D. Provide testing for each pump including:

1. Impeller, motor rating, and electrical connections shall be checked for compliance with this specification.
2. Prior to submergence, each pump shall be run dry to establish correct rotation.
3. Each pump shall be run submerged in water.
4. Test fluid shall be specified process fluid at available conditions.
5. Motor and cable insulation shall be tested for moisture content or insulation defects.
6. Test for flow and head at two additional conditions; one at 25 percent below the rated flow and one at 10 percent above the rated flow.
7. Record measured flow, suction pressure, discharge pressure, and observations on bearing temperatures and noise levels at each condition.

E. The Installer and the manufacturer's representative shall perform field test of each unit in presence of Engineer and Owner to demonstrate its ability to operate without vibration or overheating, and to operate satisfactorily over the range and at the points specified. During tests, make observation of head, capacity, motor input and bearing temperature. Correct or replace promptly defects or defective equipment revealed by or noted during tests at no expense to Owner, and if necessary, repeat tests until results acceptable to Engineer are obtained. Furnish all labor, piping, equipment, and materials necessary for conducting tests.

F. In event that Contractor is unable to demonstrate to satisfaction of Engineer that units will satisfactorily perform the service required and that they will operate free from vibration and heating, the pumping units may be rejected. Contractor shall then remove and replace the equipment at his own expense.

G. Reports: Submit reports for Source and Field testing.

3.5 TRAINING OF OWNER PERSONNEL

A. The pump/motor manufacturer shall train District personnel at the Owner's facility on the proper maintenance and operation of the product. Training services have been factored into the cost of pre-purchased equipment from pump vendor. The pump/motor manufacturer shall provide training for District personnel on the products being supplied (motor, cable and pump). The provided training at the Owner's facility shall consist of 16 hours of training. The manufacturer shall be responsible for all expenses associated with this training program.

B. Training on the Pump Control System shall include:

1. Troubleshooting
2. Basic programming and configuration
3. Setting of motor parameters into the Soft Starter
4. Discussing other important matters that pertaining to the operation and maintenance of the system.

END OF SECTION

SECTION 15060

PIPE AND FITTINGS

PART 1 GENERAL

1.1 DESCRIPTION

A. The Contractor shall provide all materials, equipment, and labor necessary to furnish and install all ductile iron pipe and fittings, and all appurtenant work, complete and operable, including all connections, as shown on the Drawings and as specified herein.

1.2 SUBMITTALS

A. Product Data: Provide product data for all materials and equipment proposed to be furnished and installed under this portion of the work, giving manufacturer's name, catalog number, and catalog cuts for each item where applicable.

B. Shop Drawings: Provide complete pipe layout of each piece and fitting, showing proposed sequence of construction. Submit drawings to the Engineer for review that illustrate details of wall thickness, pipe joint, joint gasket, and fittings and pipe supports.

C. Material list: In accordance with the provisions of Section 01300, “Shop Drawings and Submittals,” of the specifications, submit with the shop drawings a complete list of all materials and equipment proposed to be furnished and installed under this portion of the work, giving manufacturer's name, catalog number, and catalog cuts for each item where applicable. Provide complete pipe layout of each piece and fitting, showing proposed sequence of construction, testing, cleaning, and disinfection. Submit disinfection procedure. The Contractor shall prepare and submit to the Engineer a hazardous materials work plan in accordance with all state, local, federal or permit requirements. No extra payment will be allowed for the handling or removal of any hazardous materials.

D. The Contractor shall furnish the Engineer written warranties obtained from the Pipe and Fitting Installer against defects in materials and workmanship in accordance with ASTM D 3350 and ASTM F 714. Warranty conditions proposed by the Pipe Manufacturer, Fitting Manufacturer or Pipe and Fitting Installer concerning limits of liability will be evaluated and must be acceptable to the Owner.

E. Manufacturer's design drawings shall indicate, at relative scale, placement, cover, and joint assembly design. Submittals shall also include the design pipe size, and installation procedures.

F. The Contractor shall submit to the Engineer the Pipe and Fittings Manufacturer’s "Certificate of Compliance" with these Specifications for all materials delivered to the site, and shall comply with the Pipe and Fittings Manufacturer's recommendations for handling, storing, and installing pipes and fittings.

G. Paint Color Charts: Paint color charts shall be submitted to the District for selection and/or approval for all above ground items.

H. Fabricated items: Five copies of shop drawings shall be submitted to the District for review and approval prior to fabrication.

1.3 CONTROL TESTS

A. The manufacturer shall conduct and certify control tests during the manufacturing of the pipe. Test reports shall be submitted to the Engineer for review. The District reserves the right to test any pipe after delivery and to reject all pipe which fails to comply with the specified requirements. The pipe manufacturer shall certify that the materials tests are the same as materials used in manufacturing the pipe for this project.

1.4 QUALITY ASSURANCE

A. Standards: The materials and work performed in this Section shall conform to the applicable standards of:

1. The American National Standards Institute (ANSI)

2. The American Society for Testing and Materials (ASTM)

3. American Welding Society (AWS)

4. American Water Works Association Inc. (AWWA)

5. Uniform Plumbing Code (UPC)

B. Qualification of Manufacturers

1. The material shall be the product of a supplier regularly engaged in the manufacturing of pipe and plumbing products.

2. All materials shall be new and of current manufacture and shall be guaranteed against defects or workmanship in accordance with the General Conditions.

3. All ductile-iron pipe and fittings to be installed under this project shall be inspected and tested at the foundry as required by the standard specifications to which the material is manufactured. Furnish in duplicate to the Engineer sworn certificates of such tests and their results prior to the shipment of the pipe.

4. All pipe and fittings to be installed under this Contract may be inspected at the plant for compliance with this Section by an independent testing laboratory selected by the Owner at the Owner's expense.

5. Inspection of the pipe and fittings will also be made by the Engineer or representative of the Owner after delivery. The pipe shall be subject to rejection at any time on account of failure to meet any of the requirements specified herein, even though sample pipes may have been accepted as satisfactory at the place of manufacture. Pipe rejected after delivery shall be marked for identification and shall be removed from the job.

6. All pipe and fittings shall be permanently marked with the following information:

   a. Manufacturer, date.
   b. Size, type, class, or wall thickness.
   c. Standard produced to (AWWA, ASTM, etc).

1.5 DELIVERY, STORAGE AND HANDLING

A. Care shall be taken in loading, transporting, and unloading to prevent injury to the pipe. Under no circumstances shall the pipe be dropped or skidded against each other. Slings, hooks, or pipe tongs shall be used in pipe handling.

B. Materials, if stored, shall be kept safe from damage. The interior of all pipe, fittings and other appurtenances shall be kept free from dirt or foreign matter at all times.

C. Pipe shall not be stacked higher than the limits recommended by its manufacturer. The bottom tier shall be kept off the ground on timbers, rails, or concrete. Stacking shall conform to manufacturer's recommendations.

D. Gaskets for mechanical and push-on joints to be stored shall be placed in a cool location out of direct sunlight. Gaskets shall not come in contact with petroleum products. Gaskets shall be used on a first-in, first-out basis.

E. Coated pipe shall be shipped on bunks, and secured with nylon belt tied down straps or padded banding located approximately over braces.

F. Coated pipe shall be stored on padded skids, sand or dirt berms, sand bags, old tires or other suitable means so that coating will not be damaged.

G. Coated pipe shall be handled with the wide belt slings, padded forks, or other means that will not damage the pipe. Chains, cables or other equipment likely to cause damage to the pipe or coating shall not be used.

PART 2 PRODUCTS

2.1 GENERAL

A. All materials shall conform to sizes, capacity, quality and quantities as shown on the drawings or described in these Specifications. Materials shall be from new stock, delivered in good condition. No damaged stock shall be used.

B. Where no method of tests for materials is specified, the latest applicable test specified by ASTM shall be followed.

C. After delivery to the site, all materials shall be carefully unloaded, protected against breakage, rusting, and accumulation of foreign matter, disintegration and injury. The Contractor shall be responsible for all lost or damaged material supplied and work done under this contract.

D. Design criteria for pipe supports and hangers, including thrust blocking, shall be in accordance with the requirements of Section 15140, Pipe Supports and Pipe Hangers.

2.2 DUCTILE IRON PIPE AND FITTINGS – As Applicable

A. Ductile iron pipe shall be designed in accordance with ANSI Specification A21.51 (AWWA C151- 96). Joints shall be flanged. Pipelines shall be minimum Pressure Class 150.

B. Flanged joints shall conform to ANSI B16.1, 125 pound flat faced. All flanged pipes shall be shop fabricated to the exact lengths required so that no field cutting or threading is required. All flanges shall be firmly attached in the shop.

C. Gasket material for flanged joints shall be 1/8-inch thick, cloth-inserted rubber, one piece, full faced with holes to pass bolts. Gasket material shall be free from corrosive alkali or acid ingredients and suitable for use in sewage lines.

D. The exterior surface of ductile iron pipe and fittings shall have a factory-applied protective coating in accordance with Section 09900, Paints and Coatings.

E. All pipe and fittings shall be cement lined with Type V cement mortar lining, sulfate and acid resistant cement, per AWWA C104.

F. Fittings for ductile iron pipe shall conform to ANSI A21.10.

G. Minimum pressure rating of ductile iron fittings shall meet or exceed the pressure rating of the pipe to be installed.

H. Acceptable flanged fittings for ductile iron pipe include:

1. EBAA Iron – Megaflange Series 2100.

2. Smith-Blair – 912 FCA with anchor studs or Model 975.

3. Romac Industries, Inc. – RFCA.

4. Or approved equivalent.

I. Where ductile iron pipe or fittings mate to existing pipe, fittings, or valves, Contractor shall field verify existing bolt pattern and dimensions prior to ordering material and match.

2.3 BOLTS FOR DUCTILE IRON – As Applicable

A. Bolts and nuts shall be 316 stainless steel, ASTM A 193, Grade 138M hex head with ASTM A 194, Grade 8M hex nuts. Plastic washers and sleeves for dielectric joints shall be provided.

2.4 TRACER WIRE – As Applicable

A. Tracer wire shall be No. 12 AWG single strand, soft drawn copper wire with 4/64-inch PVC insulation.

2.5 COPPER PIPE – As Applicable

A. Copper pipe shall be seamless copper, conforming to ASTM B88, Type K, unless otherwise noted.

2.6 FLEXIBLE COUPLINGS – As Applicable

A. Manufacturer

1. Dresser;
2. Smith – Blair;
3. PSI.

B. Coating/Lining: AWWA C550 epoxy or approved equal.

C. Nut and Bolt Hardware Coatings: fluoropolymer. ASTM A 354 and ASTM A 194.

D. Restraint Harness: AWWA Manual M11.

2.7 FLANGED COUPLING ADAPTERS – As Applicable

A. Manufacturer:

1. EBAA Iron Megaflange
2. Smith-Blair
3. or approved equal.

B. Coating/Lining: AWWA C550 epoxy or approved equal.

C. Gaskets: As required to accommodate outside diameter of the pipe.

D. Include anchor studs for thrust restraint. Nuts and bolts shall be constructed according to ASTM A 354 and ASTM A 194, and fluoropolymer coated.

2.8 FLANGE INSULATION KITS – As Applicable

A. The Contractor shall provide a flange insulation kit for flanged connections between metallic pipes of dissimilar materials. Flange insulation kits shall be of the full face gasketed type for use with potable water.

B. Manufacturer:

1. Calpico, Inc.
2. Engineer approved equal

PART 3 EXECUTION

3.1 GENERAL

A. All laying, jointing, testing for defects and for leakage shall be performed in the presence of the Engineer, and shall be subject to its approval before acceptance. All material found during the progress to have defects will be rejected and the Contractor shall promptly remove such defective materials from the site of the Work.

B. Use proper implements, tools, and facilities for the safe and proper protection of the pipe. Carefully handle pipe in such a manner as to avoid any physical damage to the pipe and in accordance with the manufacturer's recommendations.

C. The open ends of the pipe shall be plugged when pipe laying is not in progress.

3.2 LINE AND GRADE

A. Deviations from the line or grade shown on the Drawings, as may be required during construction, will in all cases be determined by the Engineer and authorized in writing.

3.3 PIPE LAYING

A. Ductile Iron Pipe. Ductile iron pipe shall be installed in accordance with AWWA C600. Polyethylene tube shall be installed according to AWWA C105, Installation Method A. Cuts on DIP shall be coated with an acceptable bituminous material.

B. The pipe shall be installed in conformance with the requirements specified herein and as shown on the Drawings. The pipe sections shall be closely jointed to form a smooth flow line. Immediately before placing each section of pipe in final position for connecting joints, the bedding for the pipe shall be checked for firmness and uniformity of surface.

C. Proper implements, tools and facilities as recommended by the pipe manufacturer's printed instructions shall be provided and used by the Contractor for safe and efficient execution of the work. All pipe, fittings and accessories shall be carefully lowered into the trench by means of derrick, ropes, or other suitable equipment in such a manner as to prevent damage to pipe and fittings. Under no circumstances shall pipe or accessories be dropped or dumped into the trench.

D. Cutting and machining of the pipe shall be accomplished in accordance with the pipe manufacturer's standard procedures for this operation. Pipe shall not be cut with a cold chisel, standard iron pipe cutter, nor any other method that may fracture the pipe or will produce ragged, uneven edges.

E. The pipe and accessories shall be inspected for defects prior to lowering into the trench. Any defective, damaged or unsound pipe shall be repaired or replaced. All foreign matter or dirt shall be removed from the interior of the pipe before lowering into position in the trench. Pipe shall be kept clean during and after laying. All openings in the pipe line shall be closed with water tight expandable type sewer plugs at the end of each day's operation or whenever the pipe openings are left unattended. The use of burlap, wood or other similar temporary plugs will not be permitted.

F. Adequate protection and maintenance of all underground and surface utility structures, drains, sewers, and other obstructions encountered in the progress of the work shall be furnished by the Contractor at its own expense.

3.4 PIPE HANDLING

A. Handling of all pipe shall be done with care to insure that the pipe is not damaged in any manner during storage, transit, loading, unloading and installation.

B. Pipe shall be inspected both prior to and after installation in the trench and all defective lengths shall be rejected and immediately removed from the working area.

3.5 FIELD JOINTING

A. Each pipe flanged joint shall be installed in conformance with the manufacturer's printed recommendations.

B. Prior to connecting flanged pipe, the faces of the flanges shall be thoroughly cleaned of all oil, grease, and foreign material. The rubber gaskets shall be checked for proper fit and thoroughly cleaned. Care shall be taken to assure proper seating of the flanged gasket. Bolts shall be tightened so that the pressure on the gasket is uniform. Torque-limiting wrenches shall be used to insure uniform bearing insofar as possible. If joints leak when the hydrostatic test is applied, the gaskets shall be removed and reset and bolts re-tightened.

C. When pipe laying is not in progress, the open ends of the pipe shall be closed to prevent trench water from entering pipe. No pipe shall be laid when, in the opinion of the Engineer, the trench conditions or weather are unsuitable for such work.

3.6 FITTINGS

A. All fittings shall be installed utilizing standard installation procedures. Fittings shall be lowered into trench by acceptable means without damage to the fittings. Fittings shall be carefully connected to pipe or other facility, and joint shall be checked to insure a sound and proper joint.

3.7 TOLERANCES

A. Horizontal Line Tolerance: 2 inches.

B. Vertical Grade Tolerance: 1 inch. Any deviation with respect to design line and grade shall be recorded at least once per foot and the records shall be submitted to the Engineer as requested. If the alignment is off line or grade, the necessary corrections shall be made to return to the plan alignment at a rate of not more than 1 inch per 25 feet. All corrective work, including new design, if required, shall be performed by the Contractor at no additional cost to the District and is subject to the approval of the Engineer.

3.8 REPAIRS

A. Only new pipe free from defects shall be installed.

B. Broken or leaking sections of pipe must be replaced. Repair clamps will not be approved.

3.9 CLEANING

A. Care shall be taken to keep the pipe clean at all times during the installation. Prior to testing the pipe shall be flushed so that the velocities of 5 feet per second are obtained sufficient to clean the entire length of pipe.

B. If the Contractor digs out any sections subsequent to this where debris could enter the line, the line shall be again flushed through the section that was disturbed.

3.10 TESTING AND FINAL CLEANING

A. Testing and final cleaning of all pipe shall conform to the requirements of Section 15992, “Piping Systems Testing".

END OF SECTION

SECTION 15100

VALVES, GAUGES, AND APPURTENANCES

PART 1 GENERAL

1.1 Description

A. Work included:
1. This Section includes the supply and installation of gate valves, check valves, air and vacuum release valves, ball valves, pressure gauges, and related equipment.

B. Related work described elsewhere:
1. Section 09900 - Paints and Coatings
2. Section 15109 - Plug Valves
3. Section 15200 - Piping System
4. Section 15992 - Pressure Piping Systems Testing

1.2 Quality Assurance

A. Standards:
1. The materials and work performed in this Section shall conform to the applicable standards of:
   a. The American National Standards Institute (ANSI).
   b. The American Society for Testing and Materials (ASTM).
   c. American Water Works Association Inc. (AWWA).
   d. National Fire Protection Association (NFPA).
   e. National Sanitation Foundation (NSF)

B. Qualifications of manufacturers:
1. The material shall be the product of a supplier regularly engaged in the manufacturing of pipe and plumbing products.
2. All materials shall be new and of current manufacture and shall be guaranteed against defects of workmanship.

C. Qualification of installers:
1. For the actual assembly, installation, and testing of the Work of this Section use only thoroughly trained and experienced personnel who are completely familiar with the requirements for this Work and with the installation recommendations of the manufacturers of the specified items.
2. In acceptance or rejection of installed materials, no allowance will be made for lack of skill on the part of installers.

1.3 Submittals

A. Shop drawings:
1. In accordance with the provisions of the Specifications, submit complete shop drawings including layouts, elevations, and details to the District.

B. Material list:
   1. In accordance with the provisions of the Specifications, submit with the shop drawings a complete list of all materials and equipment proposed to be furnished and installed under this portion of the work, giving manufacturer's name, catalog number, and catalog cuts for each item where applicable.

C. Manufacturer's recommendations:
   1. Accompanying the materials list and shop drawings, submit copies of the manufacturers' current recommended method of installation.

1.4 Product Handling

A. Use all means necessary to protect the materials of this Section before, during, and after installation and to protect the installed work and materials of all other trades.

B. The Contractor shall provide and use proper implements, tools and facilities for the safe and proper handling and protection of the material.

C. In the event of damage, immediately make all repairs and replacements necessary to the approval of the District and at no additional cost to the Government.

D. When damaged material cannot be repaired to the satisfaction of the District it shall be removed from the job.

E. Material shall be stored in a safe location, protected from the elements where damage therefrom could result.

PART 2 PRODUCTS

2.1 General

A. All materials shall conform to sizes, capacity, quality and quantities as shown on the drawings or described in these Specifications. Materials shall be from new stock, delivered in good condition, no damaged stock shall be used.

B. Where no method of tests for materials is specified, the latest test specified by ASTM shall be followed.

C. After delivery to the site, all materials shall be carefully unloaded, protected against breakage, rusting, and accumulation of foreign matter, disintegration and injury. The Contractor shall be responsible for all lost or damaged material supplied and work done under this contract.

2.2 Brass and Bronze Components – As Applicable

A. Brass and bronze components of gates valves, gauges, and appurtenances which have surfaces in contact with the water shall be alloys containing less than l6 percent zinc and 2 percent aluminum.

B. Approved alloys are ASTM B 61; B 62; B 98 alloy A, B, or D; B 139, alloy A; B 164; B 194; B 127.

C. Stainless steel alloy 18-8 may be substituted for bronze at the option of the manufacturer and with the approval of the ENGINEER.

2.3 Gate Valves up to 2 inches – As Applicable

A. Up to 2 inches (50 mm): Bronze body, bronze trim, non-rising stem, hand wheel, inside screw, double wedge disc, soldered or threaded.

2.4 Gate Valves 3 Inches and Larger – As Applicable

A. Valves shall be iron body, bronze mounted, resilient wedge, non-rising stem valves with O-ring seals. Valves shall conform to AWWA C509.

B. Handwheels shall be furnished for all installations where valve is exposed. Valve ends shall be flanged complying with ANSI B16.1, 125 lb. flat faced or as required for the connection.

C. Manufacturer
1. Clow
2. Mueller
3. Engineer approved equal

2.5 Ball Valves – As Applicable

A. Materials:
1. Body: Bronze no-lead alloy conforming to AWWA C800 and ASTM B62.
2. Ball: Stainless steel.
3. Seats and Seals: Teflon.
4. 1/4 turn.
5. Suitable for potable water.

B. Handle: Straight lever handle, where shown on Drawings.

C. Manufacturer:
1. Mueller.
2. Ford.
3. Jones.
4. McDonald.
5. Watts.
6. Engineer approved equal

2.6 Air and Vacuum Release Valves – As Applicable

A. The air and vacuum valves shall have cast iron bodies and covers and stainless steel floats. Float guides and bushings shall be either stainless steel or bronze. Valves shall be designed for operating service up to 150 psi.

B. Manufacturers
   1. APCO American Valve and Primer Corporation
   2. Val-Matic
   3. Engineer approved equal

C. Air and Vacuum Release valves where shown installed above grade on pipelines shall be installed with a gate valve below to provide shutoff.

2.7 Swing Check Valves – As Applicable

A. Size: 3 Inches and Larger, per Plan.

B. Service: raw sewage

C. Type:
   1. Resilient seated or hydraulically operated (no-slam).
   2. Valve shall be Class 250 pressure class rating with flanged ends conforming to ANSI B16.1.
   3. In accordance with AWWA C508.
   4. Equipped with outside lever and counter-weight.

D. Installation: Horizontal.

E. Materials:
   1. Body and cover: Ductile iron ASTM A536
   2. Disc: Rubber Encapsulated ductile iron or Buna-N Rubber.
   3. Bonnet gasket: Buna-N rubber
   4. Bonnet bolts and nuts: Stainless steel.

F. Manufacturer
   1. APCO, Air Cushion, Model 250
   2. GA Industries
   3. Clow Swing Check Valves
   4. Engineer approved equal

2.8 Bolts, Gaskets, Glands, Nuts – As Applicable

A. Bolts for exposed flanged ductile iron and steel pipe shall be type 304 stainless steel bolting with the heavy duty type 304 stainless steel nuts (only).

B. Bolts, gaskets, glands, nuts, and miscellaneous accessories required to install all valves are to be furnished. Bolts for flanged connections shall be galvanized steel with American Standard regular unfinished square or hex heads. Nuts shall be galvanized steel with American Standard regular hexagonal dimensions.

C. Gaskets for flanged connections shall be suitable for the pressure, temperature, and chemical characteristics for the fluid handled. The gasket materials shall also be suitable for the pipe system physical characteristics and materials. Gaskets shall extend from the inside diameter of the flange to at least the inside edge of the bolt holes or they may extend beyond the bolt circle.

D. Jointing materials for mechanical joints shall conform to ANSI A21.11.

2.9 Pressure Gauges – As Applicable

A. Materials
1. Indicator shall have a 4 ½" dial, 316 stainless steel wetted parts and ½" MNPT connection.
2. Bourdon tube, socket, connecting tube: 316 stainless steel.
3. Case: Phenolic.
4. Diaphragm seal housing: 316 stainless steel.
5. Pressure snubber:
   a. Filter disc: 316 stainless steel
   b. Housing: Brass or 316 stainless steel.

B. Range: 0 – 160 psi

C. Accessories
1. Provide valve at point of connection to equipment.
2. Utilize pressure snubbers with porous metal discs to provide pulsation dampening.

D. Design and fabrication:
1. All components suitable for service at 250-degree Fahrenheit, or at the maximum process temperature to which the gage is to be exposed, whichever is greater.
2. Provide viewer protection from element rupture.
3. Calibrate gages at jobsite for pressure and temperature in accordance with manufacturer's instructions.
4. Equip with white faces, black numerals and black pointers.
5. Gage tapping position to be clear of equipment functions and movements, and protected from maintenance and operation of equipment. Gage to be readable from an accessible standing position.
6. Gage accuracy: 1 percent of full range.
7. Select gage range so that:
8. The normal operating value is in the middle third of the dial.
9. Maximum operating pressure does not exceed 75 percent of the full scale range.

E. Manufacturer:
1. Ashcroft Duragauge 1279.
2. Ametek
3. Or approved equal.

PART 3 EXECUTION

3.1 Surface Conditions

A. Inspection:
1. Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
2. Verify that all materials may be installed in accordance with all pertinent codes and regulations, the original design, and the referenced standards.

B. Discrepancies:
   1. In the event of discrepancy, immediately notify the ENGINEER.
   2. Do not proceed with installation in area of discrepancy until all such discrepancies have been fully resolved.

3.2 Installation

A. General:
   1. Install all materials in strict accordance with the manufacturer's written recommendations as shown on the drawings and as approved by the ENGINEER. Valve size shall be equal to line piping in which valve is installed unless otherwise noted on the drawings. Support all valves where necessary.
   2. Before installation, carefully clean valves and associated piping of all foreign material, adjust stuffing boxes, and inspect valves in open and closed positions. Install valves in accordance with the applicable portions of these Specifications. Unless otherwise indicated, install valves with the stem vertical. Installation practices shall conform to manufacturer's written recommendations.
   3. Prior to installing flanged valves, the flange faces shall be thoroughly cleaned. After cleaning, insert the gasket and tighten the nuts progressively and uniformly. If flanges leak under pressure, loosen the nuts, reseat or replace the gasket, retighten the nuts, and retest the joint. Joints must be watertight at test pressures before acceptance.
   4. Thoroughly clean threads of screwed joints by wire brushing, swabbing, or other approved method. Apply approved joint compound to threads prior to making joint. Joints shall be watertight at test pressures before acceptance.
   5. Provide all accessories necessary for proper valve operation as specified or required for the application.
   6. Provide suitable floor stands and operators at approximately a 30-inch height where required for proper valve operation. Small lever or handwheel-operated valves may need guide rails or other suitable structures for support of extension stems.
   7. Install valves with the operator in a position for convenient operation. Ensure that space is available for operation of lever or handwheel-operated valve without interference from walls, piping, or other equipment.
   8. Prior to installation, protect stored valves and appurtenances from damage due to exposure to sunlight, heat, dirt debris, freezing and thawing, vandalism, etc.
   9. Erect and support valves in respective positions free from distortion or strain on valve or connecting pipe. Do not use pipe to support valve unless approved by the ENGINEER.

B. Gate Valves:
   1. Install gate valve stem as indicated on drawings or with stems between horizontal and vertical up. Valves install with the stems below horizontal shall not be allowed.

C. Check Valves:
   1. Install check valves horizontally in pipeline at each pump discharge, unless otherwise shown on the drawings.

D. Valve Identification:
   1. Identify valves of the piping system and indicate their function and system served. Before tagging or labeling, submit to the Engineer for approval a file list of the valves.
   2. Provide all valves with identification. Provide valve chart indicating valve tag number, location of valve, service, and normal position of valve. Identify all valves by the manufacturer, including size, manufacturer's name, and pressure rating.
   3. Select composition discs for all globe, angle, and check valves in accordance with the line services
   4. The label shall be 1/16-inch stainless steel, minimum 2 inches by 4 inches in size, and shall be permanently attached to the valve.

E. Adjustment:
   1. Check and adjust valves and accessories for smooth operation. Lubricate in accordance with manufacture's recommendations.
   2. Pack all gate valves' stuffing boxes with an excess of 30 percent of packing (for future adjustment).

F. Anchor bolts:
   1. For floor stands, stem guides, etc., cast in place during concrete placement. Threads shall be protected and shall be cleaned before the nuts are attached and tightened.

3.3 Tests

A. General:
   1. Upon completion of this portion of the Work, and prior to its acceptance by the Department of General Services, make all required tests and secure all required approvals from agencies having jurisdiction.

B. Testing:
   1. Valves and related materials will be tested in accordance with Section 15200, PIPING SYSTEM, at the same time that the adjacent pipeline is tested. Joints shall show no visible leakage under test. Repair joints that show signs of leakage prior to final acceptance. If there are any special parts of control systems or operators that might be damaged by the pipeline test, they shall be properly protected. The Contractor will be held responsible for any damage caused by the testing.

END OF SECTION

SECTION 15992

PRESSURE PIPING SYSTEMS TESTING

PART 1 GENERAL

1.1 THE REQUIREMENT

A. The Contractor shall provide all materials, equipment, and labor necessary to perform and complete all pipeline pressure testing and leakage testing for all pressure piping systems, as specified herein.

B. The Contractor shall be responsible for conveying test water from the source to the point of usage and also for proper disposal, as required, of water used in the testing operations. All costs associated with supply and disposal of test water shall be at the Contractor's expense.

1.2 CONTRACTOR SUBMITTALS

A. A testing schedule, including proposed plans for conveyance, control and disposal of test water shall be submitted in writing to the Engineer for review a minimum of 72 hours before testing is to start.

B. The Contractor shall submit laboratory calibration certificates for all gages to the Engineer for review along with the testing schedule.

PART 2 PRODUCTS

2.1 MATERIAL REQUIREMENTS

A. All testing equipment and materials shall be provided by the Contractor. No materials shall be used which would be injurious to pipeline system or structure and future function. All test gages shall be laboratory-calibrated test gages and shall be recalibrated by a certified laboratory at the Contractor's expense prior to the leakage test.

PART 3 EXECUTION

3.1 GENERAL

A. All lines shall be cleaned and flushed prior to leakage testing using a "Wayne Ball," high- pressure sewer "jets", or other methods acceptable to the Engineer.

B. Contractor will be solely responsible for the proper disposal of all water used in the flushing and testing process. Disposal of all water shall be in accordance with appropriate regulatory agency requirements.

C. All flushing and testing operations shall be performed in the presence of the Engineer.

D. All tests shall be completed and approved prior to placing of permanent surfacing. When leakage exceeds the amount allowed, the Contractor at its expense, shall locate the leaks and make the necessary repairs or replacements in accordance with the Specifications to reduce the leakage to the specified limits. Any individually detectable leaks shall be repaired, regardless of the results of the tests.

3.2 CONSTRUCTION WATER

A. The District will provide access to construction water through a metered backflow protected hydrant connection. Refer to the District's hydrant location map.

B. Contractors are prohibited from operating gate valves or fire hydrants not designated for use by the District. Acquisition of water through appropriation at un-metered fire hydrants or other facilities is a violation of State Law.

3.3 PRESSURE AND LEAKAGE TESTING OF PRESSURE PIPING SYSTEMS

A. General: All pressure piping systems shall be tested for pressure and leakage using a hydrostatic test.

B. Pressure Piping Hydrostatic Test: The Contractor shall furnish all materials, equipment and labor for making a hydrostatic test. Test equipment shall be approved by the Engineer.

1. Furnish the following equipment and materials for the

tests: Amount	Description
2	Approved graduated containers
2	Approved pressure gauges
1	Hydraulic force pump approved by the
Engineer As Required	Suitable hoses and suction pipe

Gauges for testing shall be calibrated with a standardized test gauge provided by the Engineer at the start of each testing day. The calibration shall be witnessed by the Engineer.

2. Conduct the tests on exposed piping after the piping has been completely installed, including all supports and hangers.

3. Pressure Test: The Contractor shall test pressure pipe between each valve section or pipe run. The pipe shall be slowly filled with water so that air is removed and the pipe shall be tested hydrostatically to a pressure of 200 psi for a minimum of one hour. Reaction blocking pipe restraints and the like shall be installed prior to test.

All exposed pipe, fittings, valves and joints shall be examined during the test for seepage or other defects. Defects noted by this test shall be removed and replaced by the Contractor with sound material. Afterwards, the test shall be repeated to the satisfaction of the Engineer.

4. Leakage Test: A leakage test shall be conducted after the pressure test has been satisfactorily completed. The duration of each leakage test shall be two hours and during the test the main shall be subjected to a pressure of 100 psi. Leakage shall not

exceed that as shown in Table 6A of AWWA Standard C600-93 or not in excess of 10 gallons per day per inch diameter per mile, whichever is less.

If any test discloses leakage greater than specified, the Contractor shall at his own expense locate and repair the defective joints until the leakage is within the specified allowance.

5. The separate pressure and leakage tests described above for pressure pipe may be combined into one test by testing the pipe hydrostatically to a pressure of 200 psi for a minimum of two hours while completing all inspections and testing required above for seepage, defects and leakage.

6. Requirements for Exposed Pipelines: All exposed pipelines shall have no visible leakage during the specified test period. Any exposed pipeline with leakage shall be repaired or replaced.

3.4 FINAL CLEANING

A. Prior to final acceptance, all pipelines shall be flushed out and all accumulated construction debris and other foreign matter removed. Cleaning shall be done in a manner that will keep flushed debris from entering equipment and in a manner approved by the District.

B. Clean and disinfect domestic water pipelines in accordance with AWWA C651.

** END OF SECTION ***

SECTION 16050

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 GENERAL

1.1 SUMMARY

A. This section includes grounding electrodes and conductors; equipment grounding conductors; bonding methods and materials; conduit and equipment supports; anchors and fasteners; sealing and fireproofing of sleeves and openings between conduits and wall.

1.2 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. The standards referred to, except as modified in the Contract Documents, shall have full force and effect as though printed in these Specifications. These standards are not furnished to the Contactor since manufacturers and trades involved are assumed to be familiar with their requirements. The Contractor shall obtain copies of reference standards direct from publication sources as needed for proper performance and completion of the work.

B. ASTM B 187 - Specifications for Copper Bus, Rod, and Shapes.

C. IEEE 142 - Recommended Practice for Grounding of Industrial and Commercial Power Systems.

D. IEEE 1100 - Recommended Practice for Powering and Grounding Electronic Equipment.

E. NECA - Standard of Installation.

F. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

G. NFPA 70 - National Electrical Code (NEC). Latest edition.

H. UL 467 - Electrical Grounding and Bonding Equipment.

1.3 SYSTEM DESCRIPTION

A. Grounding electrode system consists of the following elements:
1. Metal underground water pipe
2. Metal frame of the building
3. Concrete encased electrode
4. Metal underground gas piping system
5. Rod electrodes
6. Service equipment
7. Enclosures
8. Separately derived systems.

B. Anchor and fasten electrical products to building elements and finishes as follows:
   1. Concrete Structural Elements: Provide preset inserts.
   2. Concrete Surfaces: Provide expansion anchors.
   3. Interior Structural Steel: Provide appropriate size beam clamps.
   4. Solid Masonry Walls: Use expansion anchors and preset inserts.
   5. Sheet Metal: Provide sheet metal screws.

1.4 DESIGN REQUIREMENTS

A. Furnish products listed and classified by Underwriters Laboratories, Inc. (UL), Electrical Testing Laboratories, Inc. (ETL), or other recognized, acceptable testing and listing agencies as suitable for purpose specified and shown.

B. Grounding shall be in accordance with the National Electrical Code (NEC). Where size, type, rating and quantities indicated or specified are in excess of NEC requirements, the more stringent requirements and the greater size, rating, and quantity indications govern.

C. Select materials, sizes, and types of anchors, fasteners, and supports to carry at least twice the loads of equipment and raceway, including weight of wire and cable in raceway.

1.5 CONTRACTOR SUBMITTALS

A. In accordance with Division 1 requirements.

B. Product Data: Submit grounding electrodes and connections for fastening components.

1.6 CLOSEOUT SUBMITTALS

A. In accordance with Division 1 requirements.

B. Project Record Documents: Record actual locations of components and grounding electrodes.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years' experience.

B. Installer: A firm with at least five years of successful installation experience on projects with electrical grounding work similar to that required for this project.

1.8 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

PART 2 PRODUCTS

2.1 GROUNDING SYSTEM

A. Except as otherwise indicated, provide for each electrical grounding indicated, an assembly of materials, including, but not necessarily limited to, cable/wire, connectors, terminals (solderless lugs), grounding rods/electrodes, bonding jumper braid, and other items and accessories needed for a complete installation. Where more than one type meets indicated requirements, selection is Installer's option. Where materials or components are not otherwise indicated, provide products as recommended by the accessories manufacturers and in compliance with the NEC, and established industry standards.

B. All grounding materials required shall be furnished new and undamaged in accordance with the following requirements:

2.2 WIRE

A. Service Equipment Grounding Electrode Conductor: Bare, soft-drawn copper, Class AA stranding, ASTM B 8. Size per the NEC, Article 250, unless otherwise noted.

B. Electrical Equipment Grounding Conductor: Insulated, soft-drawn copper, Class B stranding or solid, with green-colored polyvinyl chloride insulation, UL 83, sized according to the NEC, unless otherwise noted.

2.3 MECHANICAL CONNECTORS

A. Description: Bolt-on bronze connectors, suitable for grounding and bonding applications in configurations required for the particular installation.

B. Manufacturer
1. Burndy Corp.
2. Anderson
3. Thomas & Betts
4. 3-M Co.

2.4 EXOTHERMIC CONNECTIONS

A. Product Description: Exothermic materials, accessories, and tools for preparing and making permanent field connections between grounding system components. Molds, cartridges, materials, and accessories as recommended by the manufacturer of the molds for the items to be welded.

B. Manufacturer:
1. Cadweld (Erico Products) "Exolon" Low Emission or acceptable equal. Molds and powder shall be furnished by the same manufacturer.

2.5 FLUSH GROUND PLATES

A. Cadweld B-162 series, B-164 series, or acceptable equal.

2.6 FLEXIBLE JUMPER STRAP

A. Flexible flat conductor, 480 strands of 30-gauge, bare copper wire; ¾-inch width, 9-1/2- inch-long; 48.25 kcMil, minimum. Protect braid with copper bolt-hole ends with holes sized for 3/8-inch diameter bolts.

2.7 BONDING PLATES, CONNECTIONS, TERMINALS AND CLAMPS

A. Provide electrical bonding plates, connectors, terminals and clamps, and all accessories as recommended by bonding plate, connector, terminal and clamp manufacturer for indicated applications to obtain a complete system. Components shall be high-strength, high-conductivity copper alloy.

2.8 UFER GROUND

A. In accordance with the latest edition of the National Electrical Code.

2.9 ROD ELECTRODES

A. Material: Copper

B. Diameter: 5/8-inch (16 mm)

C. Length: 10 feet (3,000 mm)

2.10 GROUNDING WELL COMPONENTS

A. Well Pipe: 8 inches NPS (DN200) by maximum 12 inches (300-mm) long, concrete or fiberglass pipe with belled end.

B. Well Cover: Cast iron with legend "GROUND" embossed on cover.

2.11 ANCHORS AND FASTENERS

A. Materials and Finishes: Corrosion resistant, Heavy-duty expansion type.

2.12 FORMED STEEL CHANNEL

A. Manufacturers:
1. Unistrut
2. Kindorf
3. Superstrut
4. B-Line
5. Approved Equal

B. Description: Galvanized steel.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that final backfill and compaction have been completed before driving rod electrodes.

B. Verify that abandoned wiring and equipment serve only abandoned facilities.

3.2 EXISTING WORK

A. Modify existing grounding system to maintain continuity to accommodate renovations.

B. Extend existing grounding system using materials and methods as specified.

C. Install temporary wiring and connections to maintain existing systems in service during construction.

D. Perform work on energized equipment or circuits with experienced and trained personnel following all safety rules and procedures.

E. Remove, relocate, and extend existing installations to accommodate new construction.

F. Repair adjacent construction and finishes that were damaged during demolition and extension work.

G. Remove exposed abandoned grounding and bonding components, fasteners, supports and electrical identification components. Cut embedded support elements below surface of walls and floors. Patch surfaces damaged by removal of existing components to match surrounding finishes.

3.3 GROUNDING AND BONDING INSTALLATION

A. Verify that final backfill and compaction has been completed before driving rod electrodes.

B. Installation:
1. Remove paint, rust, mill-oils, and surface contaminants at connection points.
2. Install grounding electrode conductor and connect to reinforcing steel in slab or foundation.
3. Bond together metal siding not attached to grounded structure; bond to ground.
4. Bond together reinforcing steel and metal accessories.
5. Bond together each metallic raceway, pipe, duct and other metal object entering enclosures and exiting slabs. Install minimum # 12 AWG bare copper conductor.
6. Install isolated grounding conductor for circuits supplying electronic equipment in accordance with IEEE 1100.
7. Equipment Grounding Conductor: Install separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.
8. Connect to site grounding system.

9. Bond to lightning protection system.
10. Install continuous grounding using underground cold water system and building steel as grounding electrode. Where water piping is not available, install artificial station ground by means of driven rods or buried electrodes.
11. Permanently ground entire light and power system in accordance with NEC, including service equipment, distribution panels, lighting panel boards, switch and starter enclosures, motor frames, grounding type receptacles, and other exposed non-current carrying metal parts of electrical equipment.
12. Install branch circuits feeding isolated ground receptacles with separate insulated grounding conductor, connected only at isolated ground receptacle, ground terminals, and at ground bus of serving panel.
13. Accomplish grounding of electrical system by using insulated grounding conductor installed with feeders and branch circuit conductors in conduits. Size grounding conductors in accordance with NEC. Install from grounding bus of serving panel to ground bus of served panel, grounding screw of receptacles, lighting fixture housing, light switch outlet boxes or metal enclosures of service equipment. Ground conduits by means of grounding bushings on terminations at panel boards with installed # 12 AWG conductor to grounding bus.
14. Ground electrical system using continuous metal raceway system enclosing circuit conductors in accordance with NEC.
15. Permanently attach equipment and grounding conductors prior to energizing equipment.

3.4 GROUND CONDUCTORS

A. Grounding conductors shall be located and connected as indicated on drawings.

B. Ground conductors under buildings or structures shall be buried with at least 6 inches of earth cover. Buried grounding conductors extending beyond the foundations of buildings or structures shall have at least 18 inches of earth cover.

C. Exposed conductors shall be installed inconspicuously in vertical or horizontal positions on supporting structures. When located on irregular supporting surfaces or equipment, the conductors shall run parallel to or normal to dominant surfaces.

D. Conductors routed over concrete, steel, or equipment surfaces shall be kept in close contact with those surfaces by using fasteners located at intervals not to exceed 3 feet.

E. Conductors passing through floor slabs shall be installed in conduit sleeves that extend above the floor slab, a minimum of 1-1/2 inches to provide protection. Sleeves shall be sealed to maintain fireproof integrity.

F. Provide isolated grounding conductor for circuits supplying equipment and systems as shown on the drawings.

G. Provide a separate equipment-grounding conductor for low voltage distribution systems, single or three phase feeder circuit and each branch circuit with single or three phase protective devices. Install a grounding conductor in conduit with phase

and neutral conductors. Single-phase branch circuits for 120 and 277 volt lighting, receptacles, and motors shall have a phase, neutral, and ground conductors installed in the common conduit. Provide suitable bonding jumpers and approved grounding type bushings for flexible conduits used for equipment connection utilized in conjunction with the above branch circuits with. Single-phase circuits for equipment and all branch circuits installed in non-metallic or flexible conduits shall be provided with a separate grounding conductor.

H. Ground the neutral of the various transformers of separately derived systems with a bare copper conductor, installed in conduit, from the neutral directly to the building interior cold water pipe or nearest solidly grounded structural reinforcing steel, in accordance with the provisions of NEC Article 250-24. Use bolted accessible connections to the ground system so that the neutral ground can be disconnected for test. Ground the system ground conduit as detailed on drawing. Size the grounding electrode conductors in accordance with the NEC, Table 250-66, or as indicated.

3.5 CONNECTIONS

A. All connections shall be made by the exothermic welding process, except where otherwise indicated on the drawings or in these specifications. The manufacturer's instructions on the use of exothermic welding materials shall be followed in all details. All surfaces to be joined by the welds shall be thoroughly cleaned. Paint, scale, and other deleterious substances shall be removed from surfaces of ungalvanized structural steel members by grinding. Galvanized steel surfaces shall be cleaned with emery paper. Powder and molds shall be kept dry and warm until used. Worn or damaged molds shall not be used.

B. All exothermic welded connections shall successfully resist moderate hammer blows. Any connection which fails such test or which, upon inspection, indicates a porous or deformed weld shall be remade.

C. All exothermic welds shall encompass 100 percent of the ends of the materials being welded. Welds, which do not meet this requirement, shall be remade.

D. Worn, damaged, incorrectly sized, or improperly shaped molds which, in the opinion of the Engineer, do not make satisfactory welds, shall be removed from the jobsite after being physically rendered inoperable.

E. All contact surfaces of bolted and screwed connections shall be thoroughly cleaned and coated with oxide inhibitor before being securely tightened.

3.6 CONDUIT GROUNDING

A. All grounding bushings within all enclosures, including equipment enclosures, shall be wired together and connected internally to the enclosure grounding lug or grounding bus with a bare copper conductor. Grounding bushings shall be grounded with conductors sized in accordance with NEC, but not smaller than #8 AWG.

3.7 EQUIPMENT GROUNDING

A. Comply with NEC 250, except where larger sizes or more conductors are indicated.
   1. All electrical equipment shall be connected to the grounding system with an insulated, green, stranded or solid copper equipment-grounding conductor.
   2. Terminate each end on suitable lug, bus, or bushing. The term "electrical equipment", as used in this article, shall include, but not be limited to, all enclosures containing electrical connections or bare conductors, except that individual devices, such as solenoids, pressure switches, and limit switches, shall be exempt from this requirement, unless the device requires grounding for proper operation.
   3. Large equipment, such as metal-clad or metal-enclosed switchgear, will be furnished with a grounding bus that shall be connected to the grounding system.
   4. Most other equipment will be furnished with grounding pads and/or grounding lugs which shall be connected to the grounding system. All ground connection surfaces shall be cleaned immediately prior to connection.
   5. Contractor shall furnish all grounding material required, but not furnished with the equipment.

B. Install equipment grounding system such that all metallic structures, enclosures, raceways, junction boxes, outlet boxes, cabinets, machine frames, portable equipment and other conductive items in close proximity with electrical circuits will operate continuously at ground potential and provide a low impedance path for possible ground fault currents.

C. Where grounding system extension stingers are indicated on the drawings to be provided for connection to electrical equipment, the Contractor shall connect the bare grounding conductor to the equipment ground bus, pad, or lug. Except where otherwise indicated on the drawings, all equipment ground conductors that are not an integral part of a cable assembly, shall be sized in accordance with the requirements of NEC. All ground conductors installed in conduit shall be insulated.

D. Suitable grounding facilities, acceptable to the Engineer, shall be furnished on electrical equipment not so equipped. The grounding facilities shall consist of compression type terminal connectors bolted to the equipment frame or enclosure and providing a minimum of joint resistance.

E. The conduit system is not considered to be a grounding conductor, except for lighting fixtures. No grounding conductor shall be smaller in size than # 12 AWG, unless it is a part of an acceptable cable assembly.

3.8 GROUND SYSTEM RESISTANCE

A. All ground resistance measurements shall be made with a three-terminal "Megger" type ground tester which applies alternating current to the electrodes and which gives a reading in direct current ohms. Two reference ground probes shall be used, and all tests shall be made in accordance with the instrument manufacturer's

instructions for ground resistance testing. Some of the acceptable instruments are as follows:

1. Megger Null Balance Earth Tester, James G. Biddle and Company.
2. Vibroground, Associated Research, Inc.
3. Ground-Ohmer, Herman H. Sticht Co., Inc.

B. Submit final certified test reports of all grounding tests.

3.9 ANCHORS, FASTENERS AND SUPPORT

A. Installation:

1. Locate and install anchors, fasteners, and supports in accordance with NECA "Standard of Installation".
2. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
3. Do not use spring steel clips and clamps.
4. Do not use powder-actuated anchors.
5. Do not drill or cut structural members.

B. Supports:

1. Fabricate supports from structural steel or formed steel members. Rigidly weld members or install hexagon head bolts to present neat appearance with adequate strength and rigidity. Install spring lock washers under nuts.
2. Install surface-mounted cabinets and panel board with minimum of four anchors.
3. In wet and damp locations use steel channel supports to stand cabinets and panel boards 1 inch off wall.
4. Use sheet metal channel to bridge studs above and below cabinets and panel boards recessed in hollow partitions.

3.10 ACCEPTANCE TESTING

A. In accordance with Division 1 requirements.

B. Grounding and Bonding: Perform inspections and tests as outlined below (NETA ATS, Section 7.13 – Grounding Systems).

1. Visual and Mechanical Inspection
   a. Inspect ground system for compliance with drawings and specifications.
   b. Electrical Tests (Small Systems)
      1) Perform ground-impedance measurements utilizing the fall-of- potential method per ANSI/IEEE Standard 81 "IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potential of a Ground System." Instrumentation utilized shall be as defined in section 12 of the above guide and shall be specifically designed for ground impedance testing. Provide sufficient spacing so that the plotted curves flatten in the 62% area of the distance between the item under test and the current electrode.

c. Electrical Tests (Large Systems)

1) When sufficient spacing of electrodes per Electrical Tests (Small Systems) is impractical, perform ground impedance measurements utilizing either the intersecting curves method or the slope method. (Ref. Nos. 40 and 41 in IEEE Std. 81).

d. Equipment Grounds

1) Utilize two-point method of IEEE Std. 81. Measure between equipment ground being tested and known low-impedance grounding electrode or system.

2. Test Values

a. The main ground electrode system impedance-to-ground shall be no greater than five (5) ohms for commercial or industrial systems and one (1) ohm or less for generating stations, transmission stations, and large industrial systems. Equipment grounds, depending on size and length of grounding conductor, should be only fractionally higher than system ground.

END OF SECTION